

Commercial Fisheries Abstracts

a monthly summary of important developments
for the fishery industries

In this issue ~

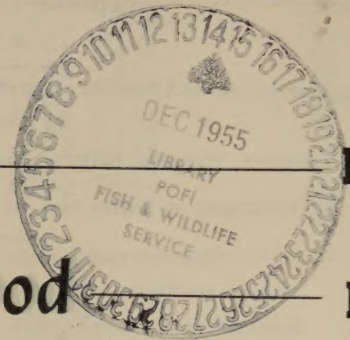
- Electrical Fishing — P.5
- Ultrasonics and Food — P.7
- Nutritive Value, Fish Meal — P.13
- Determination of Protein — P.17
- Radiation and Nutrition — P.19

~ and 35 others

Vol.8 No.11

November 1955

Fish and Wildlife Service
U.S. Department of the Interior
Washington D.C.





Commercial Fisheries Abstracts



Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS

KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle

F. BRUCE SANFORD, Chemist, Seattle

Applications for **COMMERCIAL FISHERIES ABSTRACTS**, which is mailed free to members of the fishery industries and allied interests, should be addressed to the

Director, Fish and Wildlife Service, United States Department of the Interior, Washington, 25, D. C.

Fulfillment of foreign requests confined to Government agencies, research institutions, and libraries.

The Service assumes no responsibility for the accuracy of material from outside sources, and can fulfill requests for copies of the articles only if the abstract was taken from a Service publication. Readers should direct requests for other articles to the author of the article or to the publication in which it appeared. The addresses of these publications are available from the Fish and Wildlife Service, Washington 25, D. C., and will be sent to inquirers upon request.

The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

- | | |
|---------------------------|----------------------|
| 0 General and theoretical | 5 Vitamins |
| 1 Fish by species | 6 Fishery byproducts |
| 2 Fresh fish | 7 Analytical Methods |
| 3 Preserved fish | 8 Composition |
| 4 Oils | 9 Miscellaneous |

1.019 AN OUTLOOK OF THE PHILIPPINE TUNA FISHERIES Villadolid, D. V.; Megia, Teodoro G.; and Ronquillo, Innocencio The Philippine Journal of Fisheries 2, No. 2, 161-163 (July - December 1953) The commanding position of the tunas in the world's fisheries attracts increasing attention to the exploration of tropical waters. Lying within this belt of warm waters, the Philippine seas naturally constitute an integral unit of the great tuna fisheries of the Asiatic quadrant of the Pacific, which in the past has produced 78 percent of the Pacific tonnage. Realizing this potentiality, the Philippine Bureau of Fisheries plans to launch a large scale investigation of the areas that bear promise of excellent yields. Such areas as southeastern Mindanao where the Pacific Equatorial Current begins, and northeastern Luzon which is known to be within the path of tuna migration will be investigated using the 187-ton M/S Fisheries of the Philippine Bureau of Fisheries. Aside from the tuna exploration work carried out by the Japanese in scattered areas in the Philippines, there has been no systematic survey undertaken within territorial waters. The Philippine Fishery Program of the U. S. Fish and Wildlife Service made several attempts using the Japanese longline. Although the results obtained were not altogether encouraging, the exploratory work has led to an appreciation of the importance of collecting oceanographic information and correlating it with the tuna catch. In 1950, confident of the practicability of the Japanese-type surface longline, the Pacific Fishing Developing Company of the Philippines acquired two tuna boats, each of about 50 tons capacity. Equipped with the longline and manned by experienced Taiwanese fishermen, the M/V Nelly and the M/V Dinia have fished several areas, principally the Sulu and Celebes Seas. Although their catch records do not show figures close to the reported Japanese catch ratio of 7.0 for Sulu Sea and (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: M. R. Greenwood	1.110 REACTION OF TUNAS TO STIMULI, 1952-53. PART I: RESPONSE OF TUNA TO CHEMICAL STIMULI, PART II: RESPONSE OF TUNA TO VISUAL AND VISUAL-CHEMICAL STIMULI Tester, Albert L.; van Weel, P. B.; Naughton, John J.; and Heisao, Sidney C. (Pacific Oceanic Fisheries Investigation and Hawaii Marine Laboratory, University of Hawaii) Special Scientific Report: Fisheries No. 130. United States Department of the Interior, Fish and Wildlife Service, Washington, D. C. (March 1955) The work reported in this paper is a continuation of the studies undertaken in 1951 on the response of tuna and other fish to chemical, visual, auditory, and electrical stimuli. Objectives of the study include a better understanding of tuna behavior and the possible application of tuna-attracting methods by commercial fishing vessels at sea. The field of chemoreception produced the most promising results in the early tests, when both captive little tunny (<i>Euthynnus affinis</i>) and yellowfin (<i>Neohunnus macropetrus</i>) showed response to clear, almost colorless extracts of tuna flesh. Tuna used in the studies were caught by trolling with the University of Hawaii research vessel Salpa and established in a concrete tank and in a pond on Coconut Island. In the concrete tank, 35 x 11 x 4 feet, supplied with running sea water, only 2 out of 13 tunny were established and only 2 out of 11 yellowfin survived for a short period of time. In the pond, which was 360 feet long, 75 feet wide, and 3 to 10 feet deep, 5 out of 13 yellowfin became established and took feed, and 13 tunny out of 15 introduced became established for periods ranging from 2 months to over a year. The captive tunas were fed on Tuesday, Thursday, Saturday, and occasionally Sunday of each week, their diet consisting mostly of tuna flesh or marlin plus other scrap fish which were available. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Donald E. Powell
1.81 OYSTER PROCESSING RESEARCH FOR ATLANTIC AND GULF COASTS Lee, C. F. (Fish and Wildlife Service, College Park, Maryland) Commercial Fisheries Review 17, No. 4, 29-30 (April 1955) Contracts to study the oyster industry have been signed with three universities in the Gulf Coast states under the provision of the Saltonstall-Kennedy Act. The work at Florida State University will include periodic chemical and other analyses of typical local oysters as well as an investigation of the possibility of freezing special products, such as blanched or smoked oysters. Another interesting project will be the study of the changes in fat content of oysters in relationship to quality deterioration in frozen storage of oyster products. The group at Louisiana State University will study the effect of variables during the actual freezing processes on the quality and amount of drip. Bacterial studies of oysters will be made during the shucking, washing, freezing, storage, and thawing operations. Tests will be made to determine which variables can be correlated with organoleptic quality. Periodic collections of oysters will be made in the Gulf States west of Florida so information can be obtained on seasonal and environmental effects on chemical and physical composition. The third group at Tulane University has begun a study of the physiology of the bleeding reaction of oysters which causes excessive drip formation in the thawing of the frozen oysters. Drip is greater for the Gulf Coast oysters than for the oysters further north. Plans are being made to study the physiological basis for the variable dark pigmentation found in these oysters. This characteristic detracts from their more general acceptance in inland areas. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Lois Elgin	1.0112 PACIFIC OCEANIC FISHERY INVESTIGATIONS Anonymous Commercial Fisheries Review 17, No. 5, 38-39 (May 1955) On a recent cruise in the central Pacific, members of the Pacific Oceanic Fishery Institute observed that there may be an albacore tuna fishing area north of Hawaii. It is still too soon to tell how abundant albacore are in this region. Temperature and other characteristics are favorable over a large area, and experimental fishing done to date has illustrated that albacore occur there in some quantity. In addition to the oceanographic studies, line-bait surveys were conducted at Midway and Laysan Islands. The discovery of new bait resources would be very helpful to the Hawaiian tuna industry because the catch of skipjack tuna is sometimes limited by a lack of small bait fish. Such a discovery would also enable the industry to expand its operations over a broader area than is now fished. The small bait fish were more numerous at Midway than at Laysan. Five trolling lines were kept out during daylight hours. During these hours a careful lookout was maintained for tuna schools, bird flocks, scattered birds, and mammals. A count was made of the Hawaiian monk seal, found only in the Leeward Hawaiian Islands. This rare mammal, once thought to be heading for extinction, now appears to be holding its own. COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 1 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Lois Elgin
PHILIPPINE TUNA FISHERIES OYSTER PROCESSING RESEARCH	STUDY OF TUNA REACTIONS TUNA EXPLORATION

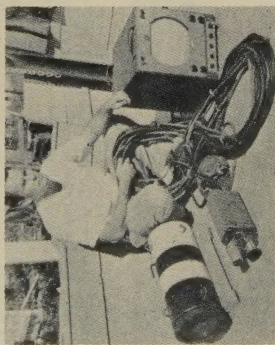
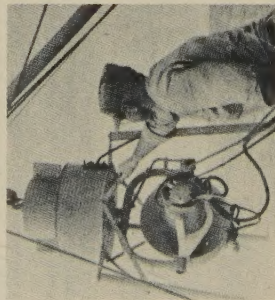
1.81 (Cross Reference 1.10) The staff at the Fishery Technology Laboratory at College Park will be responsible for the general direction and coordination of the groups. Samples will be analyzed here for physical and chemical composition. Variables introduced by different handling practices in commercial processing plants will also be studied.	1.0112 (Cross Reference: 1.10)
1.019 (Cross Reference: 1.10) 9.5 for Celebes Sea, the results show promise of economic possibility. During eight consecutive days in August, fishing an average of 18 hours per day, a total of 123 tuna weighing 7,920 kg. (21,225 pounds) were caught. These tuna averaged about 175 pounds apiece. During September and October a total of 44 fish were taken during eight non-consecutive days. Considerable quantities of shark, swordfish, and sailfish were taken throughout the investigation. Data collected reveal much interesting information basic to the understanding of the causes underlying the success or failure of tuna fishing in those areas. Yellowfin tuna dominated the catch. Even at subsurface levels, there was evidence of predation by sharks which are normally surface-feeders. In August and September when the warm waters from the lower latitudes must have reached their northernmost displacement, tunas were still found in the two fishing areas. The above information demonstrates the value of a knowledge of certain oceanographic factors in tuna longline operations. Of these factors, temperature, current drift and set, transparency, and bottom topography are the most important in the light of the Japanese observations gathered in the tropical regions of the Pacific. Based on the Japanese investigations, the best catches were made in waters the temperature of which from the surface to a depth of 100 meters was over 20° C., the transparency between 25 and 35 meters, and the current drift between 0.5 and 1.5 knots.	1.10 (Cross References: 2.14, 2.1127) To test tuna reactions, test substances were introduced into the tank or pond through a stream of water supplied by an electric pump. The tuna showed a definite response to certain substances, especially to clear aqueous or alcohol extracts of tuna flesh. The reaction was similar to feeding activity, the fish accelerated their swimming rate, surfaced, returned to the area where the substance was introduced, circled, splashed, broke up school formation, and bit at incidental objects floating on the water. It was postulated that tuna flesh contains a substance, or substances, which is sensed by the tuna and which promotes the feeding urge. This attractant substance was found to be present in flesh, viscera and blood of several tuna species and in certain white-fleshed fish. It was not found in beef blood, but was found in tuna canner byproducts. Little tunny in the pond were tested for their response to visual and visual-chemical stimuli by dipping a pair of lures into the water every two seconds at periodical intervals and in association with stock extract of tuna flesh. It was noted that schools of tunny entered and spent more time in the "attraction area" when the lures were operated, and especially so when the lures were used in conjunction with the extract. Swimming speed of the fish was increased from an average of 2.12 feet per second for controls to an average of 3.84 feet per second when both lures and extract were used.

2. 01 THE BACTERIAL FLORA OF FRESH FISH AND ITS TECHNOLOGICAL IMPLICATIONS Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.) Symposium on Cured and Frozen Fish Technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter 5 (November 1953) The classification of the bacterial flora of fish is in a state of flux. Formerly, <i>Achromobacter</i>, <i>Flavobacterium</i>, <i>Micrococcus</i>, and <i>Pseudomonas</i> were generally believed responsible for causing fish spoilage; however, recent studies have indicated that <i>Corynebacterium</i> and <i>Mycoplana</i> also probably occur on fish in variable proportion. The latest edition of Bergéy's manual has changed the organisms originally classified as <i>Achromobacter</i> to <i>Pseudomonas</i>. Although the existence of a definite 'generic succession' of bacteria during fish spoilage has been proposed, it is not certain whether such a succession always occurs. As the bacteria in fish muscle grow, it is accompanied by decomposition of muscle carbohydrates, proteins, and soluble nitrogen constituents. Since the composition of the muscle of different species vary and the bacterial population involved is complex, no consistent degradative pattern can be expected. Very little is known about the course of breakdown of fish muscle protein by bacteria. Significant proteolysis occur only in the advanced stages of spoilage; ammonia is liberated by the bacterial deamination of free amino acids. The more acid the fish muscle is, the more resistant it is to bacterial decomposition. Attempts, therefore, have been made to retard bacterial spoilage by lowering the pH values of the fish muscle below 6.0 but have not been successful because the muscle proteins become less hydrophilic and release free liquid as they approach their isoelectric zone. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: D. T. Miyauchi	2. 1121 NEW TRAWL OFFERED INDUSTRY Anonymous Southern Fisherman 15, No. 6, 74-75 (June 1955) A long-time member of the shrimp industry has developed a new type of bottomless shrimp trawl. It is so constructed that it can be fished either as a box trawl, or, by simple adjustments, as a balloon trawl. U. S. Patent No. 2,618,879 has been issued for "new and useful improvement in bottomless box and balloon trawl net, including front netting and adjustably connected trawl boards." The front netting is a straight piece of webbing hung on the cork line across the mouth of the trawl, from door to door. It has the same depth as the straight side walls, with no leads on the bottom which allows it to fish from 4 to 12 inches off the bottom. It is said that the front netting will prevent the larger shrimp from escaping from the mouth of the trawl, at the same time allowing smaller shrimp to escape through the open meshes. It is also supposed to keep the larger fish out of the trawl. The end result is said to be that one-third to one-half more large shrimp can be caught with this trawl than with others of the same size but which have no front netting. The construction of the trawl is simplified by the use of straight pieces of webbing. The only seams are where the webbing is joined. There are no joints or tapers to cut. The sides of the trawl are of straight pieces of webbing, the same length from boards to bag, and the bag itself is a straight-sided box. The taper of the top of the trawl is obtained by cutting along the natural taper of the meshes so there is no cutting of piecing and so that the trawl can be hung to the supporting cable of rope at the knot of each mesh. This method of hanging allows the trawl to fish with the meshes of the webbing open, allowing small shrimp and other fish to escape through the open meshes. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
2. 12 LOOK WHAT'S ON TELEVISION Newsome, Hal Southern Fisherman 15, No. 6, 32-33, 82 (June 1955) The Fish and Wildlife Service gear development crew located at the University of Miami Marine Laboratory was the first to design and build a compact, fully-mobile underwater television mechanism for the study of fishery gear in action. Although it took over a year to assemble the necessary electronic data, the model vehicle was built in a few months out of available equipment for a cost of only about \$500. The present unit is maneuverable by remote control to view a horizontal field of 360° and a vertical elevation of 90°. It can hover above the bottom, rest on the bottom with a tripod attachment, or be towed ahead of or behind the net. The flexible aiming of the cameras includes a full panoramic sweep. The camera itself is enclosed in a glass-end water-tight steel cylinder, which in turn is held in a round housing. A submersible power generator unit for providing remote control through a multi-conductor waterproof cable leading to the control panel and to the TV screen is also contained in the camera housing. In addition to the usual focus and lens opening adjustments that have to be made by remote control, there are about 18 TV adjustments on the underwater set in comparison to half dozen on a home TV set. Water and climatic conditions are ideal both for marine research and for underwater TV in the area between Baker's Haulover and Ft. Lauderdale, Florida. The water in this area is clear and warm the year around. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug	2. 1127 OXYGEN REQUIREMENTS OF SOME HAWAIIAN TUNA BAITFISH Pritchard, Austin (Department of Zoology, Oregon State College) Special Scientific Report: Fisheries No. 146, United States Department of the Interior, Fish and Wildlife Service, Washington, D. C. (May 1955), 30 pp. Live-bait fisheries for tuna are dependent on a steady supply of satisfactory bait fishes. In the Hawaiian fishery for aku (skipjack or striped tuna), the two most common bait fishes used are the nehu (<i>Soleolephorus purpuraceus</i>) and the iao (<i>Pranesus insularum</i>). Considerable bait mortality on the vessels, especially following transfer of the bait fishes to the live well, is normal, averaging 20 - 30 percent and sometimes amounting to 50 - 100 percent. Mortality is caused by several factors including physical injury to the bait and oxygen depletion, the latter factor is more important in the vessels which depend on holes in the bottom of the well for water circulation. The present study was aimed at laboratory analysis of the oxygen requirements of bait fishes to furnish information of value to the commercial live bait fisheries. The experimental bait fishes were kept in a shallow wooden box with circulating sea water at the Hawaii Marine Laboratory on Coconut Island. The nehu was found to be too delicate for extended experimentation and soon was discarded, with subsequent experiments focused almost completely on the iao. Large mortalities were experienced in the hot summer months during the time of the experimental work (1950-1953). The unmodified Winkler procedure was used for measuring dissolved oxygen for all experiments in which the water in the experimental container was continually being renewed. For measuring rate of oxygen consumption, the flowing-water method was used in which carbon dioxide and other metabolic products are continually removed. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Donald E. Powell
BACTERIAL FLORA OF FISH UNDERWATER TELEVISION	NEW SHRIMP TRAWL OXYGEN REQUIREMENTS OF BAIT FISH 3

2. 112 (Cross Reference: 2. 116)

Operations thus far have been in depths of 10 - 70 feet using natural light. The eventual hope is to shoot down to 350 feet using the most effective artificial light that doesn't scare the fish. Possibly either ultraviolet or infrared artificial light may turn out to be what is needed to provide adequate lighting at greater depths without frightening the fish and other marine life. Shrimp in particular have shied away from all white lights tried so far.

Actual observations to date have been confined largely to shrimp trawling off Key West and to tests of the mid-water type trawl using different types of net mouths, doors, floats, and chain rigs. The most interesting single observation was the tendency of the lead lines of shrimp trawls to bounce continuously up and down off the bottom, permitting shrimp to escape underneath. There are several different possibilities for correcting this fault but the important point is that no one even suspected this weakness until the operation was directly viewed underwater.



2. 01

In the discussion of preserving fish by chemical means, the following compounds were among those mentioned:

- (1) Sodium chloride. Its value as a fish preservative is affected by factors such as its concentration, rate of penetration, degree of contamination with salt tolerant or halophilic microorganisms (Sarcina or Serratia), and the storage temperature of the treated product.
- (2) Benzoic acid and its esters have been used widely in some countries but are somewhat ineffective if the fish muscle pH is nearly neutral.
- (3) Sodium nitrite is an effective bacteriostat if the fish muscle is below pH 6.5; and it does inhibit trimethylamine formation at a higher pH.
- (4) Hydroxylamine inhibits bacterial spoilage at both acid and alkaline pH but appears to have a cumulative toxic effect in animals.
- (5) Antibiotics. Of the 15 antibiotics studied, aureomycin was found most effective and terramycin showed good preservative effects. For aureomycin, one-half to one part per million is extremely effective for direct addition and 1 to 4 parts per million for ices. Other uses include adding small quantities of aureomycin in chilled sea water for holding eviscerated fish and using 50 parts per million in sea water in which fish are given a one-minute dip prior to icing them in the usual manner.

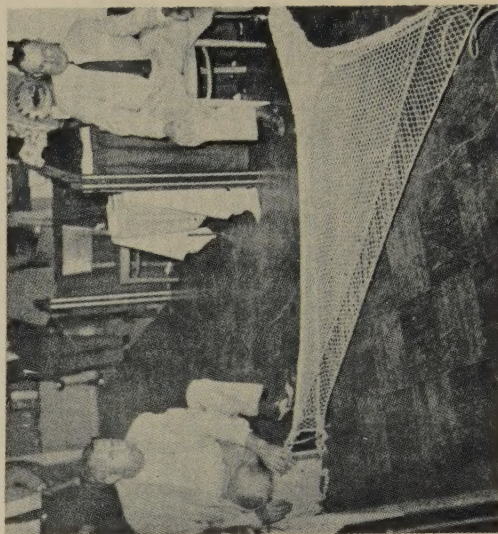
Tests designed to determine the bacteriological quality of fish are of 2 kinds: (1) those determining the size of the bacterial population, i.e. direct microscopic bacterial count; (2) those which measure the products of metabolism of the organisms, i.e. testing for H₂S, indole, volatile acids, tyrosine, and various volatile bases. Because the spoilage of fish is extremely complicated -- being dependent upon factors such as the type and number of microflora present, the variety of fish and the storage temperature, -- it has proven difficult, and probably may be impossible, to find a single test for determining the bacteriological quality of fish.

2. 1127

Lethal levels of oxygen and rates of oxygen consumption under various conditions were studied. Special emphasis was placed on the effects of crowding, flow-rates, and oxygen concentration of the water. Serial observations revealed that in the lagoon oxygen consumption fluctuated considerably from hour-to-hour regardless of apparent outward activity of the fish. During the first 24 hours in the box, no rhythmic cycle of metabolic rate could be ascertained.

Oxygen consumption showed an increase with an increased flow-rate. It was not possible to determine precisely the "critical oxygen level", that is, the point at which the rate of oxygen consumption became dependent upon the oxygen concentration of the water, but it was between 1.5 and 2.5 cc./l. Breathing and oxygen consumption decreased steadily below this level. Individual lagoon showed marked difference in their resistance to oxygen deficiency, lethal values ranging from 0.50 to 1.58 cc./l. At the higher temperature (in the range from 19° to 29° C.) there was a more rapid increase in the rate of oxygen consumption and in lethal values of oxygen.

2. 1121 (Cross Reference: 1. 85)



2. 12

BOTTOM FISH AND SHELLFISH EXPLORATIONS IN THE PRINCE WILLIAM SOUND AREA, ALASKA, 1954

Schaefer, E. A.; Smith, K. A.; and Greenwood, M. R. (Fish and Wildlife Service, Seattle, Washington) Commercial Fisheries Review 17, No. 4, 6-28 (April 1955)

From February 26 to April 6 and from July 13 to September 8, 1954 the bottom fish and shellfish populations of the Prince William Sound area in Alaska were investigated by the U. S. Fish and Wildlife Service's Exploratory Fishing Section. Other trawls and beam trawls were fished by the section's vessel, John N. Cobb; and king crab pots and shrimp traps were set from the Cobb and a motor launch.

This investigation was carried out as part of the Service's long-range plan to explore untapped fishery resources in waters of Alaska. Prince William Sound was studied at this time in an attempt to find commercial quantities of bottom fish, shrimp, and/or king crab which might help replace revenue lost as a result of the depletion of pink salmon in this area.

Bottom fish. --Commercial quantities of Pacific ocean perch, sablefish, and starry flounder were taken in otter-trawl drags in the offshore waters adjacent to Prince William Sound during the second period of operations. Pacific ocean perch were taken in amounts up to 3,800 pounds per one-hour drag 12 to 24 miles south of Point Elrington and up to 6,000 pounds per one-hour drag near Middleton Island. Up to 1,000 pounds of sablefish were caught in one-hour drags 12 to 24 miles south of Point Elrington. Some sablefish and considerable quantities of Pacific ocean perch were taken in other areas outside Prince William Sound -- mostly in waters 50 or more fathoms in depth. Up to 1,800 pounds of starry flounder were taken in more shallow waters between Cape Hinchinbrook and the Egg Islands. No good catches were made outside Prince William Sound during the first period of operations.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 11 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. R. Greenwood

2. 6

LET THE HOME ECONOMIST TELL IT

Jones, Lila M. (Home Economics Department Head, H. J. Heinz Company) Canner 120, No. 28, 18, 20-21 (July 11, 1955)

Since women make up a large percentage of the customers of food items, it is necessary to speak their language in promoting food products. The home economist is trained in the arts of homemaking, particularly food and nutrition, and is well suited to communicating with prospective consumers.

Many progressive food processors are enlarging their home economics departments. Home economics departments are being given more control of food publicity, recipe booklet formulation, introduction of new products and the planning of advertisements for commercials, storepieces and labels. One of the home economist's chief abilities is that she can easily project herself into the homemaker's shoes but, because of her training, she can also be objective and analytical.

The average food processor's lines of communication include: (1) advertising -- magazines, newspapers, radio, direct mail and now television; (2) point of purchase displays; (3) packaging gimmicks; (4) publicity through food pages of magazines and newspapers, and on women's programs on radio and television; (5) recipe booklets; (6) direct mail service; and (7) personal contacts.

Advertising of food items depends a great deal on attractive illustrations. However, using appetizing pictures of food does not necessarily succeed in motivating the homemaker to buy. The right additional appeal, such as ease in preparation or economy, can often be suggested by the home economist. Recipes and serving ideas are very important in advertising. A well-equipped test kitchen and a well-trained staff of home economists are able to produce recipes that will appeal to most women. The recipes can be used as leaflets, tie-in display suggestions or on the containers.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 11 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Lois Elgin

ALASKA FISHERY EXPLORATION

ROLE OF HOME ECONOMIST

2. 14

YOUR GUIDE TO ELECTRICAL FISHING (PART 2)

Cattley, J. G. (Fisheries Laboratory, Lowestoft) World Fishing 4, No. 4, 166-169 (April 1955)

The fish in the electrical field. --The values of "body voltage" have been determined for a number of kinds of fish. "Body voltage" varies with species, but it is always between one-half and one and one-half volts.

When using electricity for fishing, it is necessary that the voltage gradient be equal to, or greater than, the "body voltage" of the fish being sought. If the voltage gradient of an electrical field is less than one volt per foot and the fish has a "body voltage" of one volt and a length of one foot, he will be unaffected any place in the field except near the electrode where the voltage gradient is more than one volt per foot. A shorter fish with the same "body voltage" mentioned above would have to be still closer to the electrode to be affected. If the voltage gradient of the field was one volt per foot and a fish with the same "body voltage" was more than a foot long, he would be affected any place in the field.

The resistance of water. --Resistance is the opposition to electrical current flow. Mediums with the highest resistance are the poorest conductors of electricity. The resistance of water decreases with increases in temperature (opposite reaction as metals). The resistance of water varies from as much as 10,000 ohms per cubic inch in pure mountain streams to as little as 9.34 ohms per cubic inch in open sea water.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 11 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. R. Greenwood

2. 14

YOUR GUIDE TO ELECTRICAL FISHING (PART 3)

Cattley, J. G. World Fishing 4, No. 5, 202-205 (May 1955)

The Kiel Förde experiments. --In April of 1952 Dr. Kreutzer and his associates demonstrated in Kiel Förde that 20 cm. -long Baltic herring and 40 cm. -long cod released into an electrical field will swim to the anode from distances of 10 and 15 meters respectively. The cathode, two metal plates with a total area of approximately 45 square feet, was fastened to the hull of the vessel. The anode, a metal plate of approximately 25 square feet, was suspended vertically from two floats about 40 meters from the cathode.

The shape of the pulse generated by Dr. Kreutzer's apparatus is triangular with a sharp rise from zero and a much slower decay. The optimum frequency is determined by the type (mode of swimming) and size of the fish being used.

Pulses of 14,000 amperes were required in the Kiel Förde experiments with a minimum mean power requirement of about 66 kilowatts. Salinity and temperature at the site were 16 percent and 5° C. respectively. In open sea, with the salinity about 34.33 percent and the temperature 5° C., similar results would require a minimum mean power value of up to 132 kilowatts or 177 h. p. These experiments point out that the power requirements needed for this type of electrical fishing are not practicable for use aboard present-day fishing vessels.

Fish screens. --In Scotland, upstream migrant salmon and sea trout have been blocked from tail race tunnels of water turbines with electric screens which were 100 percent effective. Downstream migrant smolts have been blocked from entering forebays of hydroelectric installations with electric screens having up to 70 percent effectiveness.

The electric tummy rod. --The electric tummy rod device used to overcome the struggles of hooked tummy makes it easier to land the fish, thus resulting in greater manpower efficiency. The wire trace

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 11 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. R. Greenwood

ELECTRICAL FISHING GUIDE

ELECTRICAL FISHING

The popularity of television has increased the importance of home economists. The home economist may supply ideas for commercials and prepare foods to be shown. She may do the demonstration on the screen, thus giving the homemakers a feeling that a real homemaker is cooking.

Other lines of communication open to home economists include: publicity service to food editors, lecture demonstrations, and correspondence with homemakers. Good communications are vital to business, and the home economist is ready and eager to help the food processor achieve this end.

(leader) and hook are the anode, and the cathode is either on the hull of the vessel or somewhere along the line. When a tunny strikes, a charge of about 35.9 amperes (for a 2.9 meter tunny) of pulsed d. c. current is transmitted down the line. The pulses of current are continued for only a few seconds. The tunny stays in a state of narcosis from 20 to 40 seconds.

The electric whale harpoon. --The purpose of the electric whale harpoon is to provide a quicker, more certain, and more humane way of killing whales. About 60 amperes of a. c. current is automatically transmitted down the forerunner as the harpoon is fired from the spigot gun. The harpoon head is the anode, and the cathode is a plate of some kind on the hull of the vessel. It takes only 10 - 15 seconds to kill the whale, but the current is usually continued about three minutes as a safety precaution.

Shrimp. --Favorable shrimp catches were made with the beam trawl during the second period in Orca Bay, Port Gravina, and Montague Strait. Ten drags in Orca Bay at depths of 58 to 86 fathoms caught from 96 to 262 pounds and averaged 154 pounds per hour. Four drags in Port Gravina averaged 199 pounds per hour, and 3 drags in Montague Strait averaged 207 pounds per hour. Most shrimp caught in the beam trawl were pinks (Pandalus borealis), although quite a few side-stripe shrimp (Pandalopsis dispar) were also taken. Shrimp trap sets caught nothing except a few coon-stripe shrimp (Pandalus hypsinotus) and very few spot shrimp (Pandalus platyceros) both in College Fiord. A limited number of beam-trawl drags made in the Orca Bay-Port Gravina area during the first period produced good indications of shrimp, but other matters precluded further investigations at that time.

King crab. --Collapsible king crab pots were fished in several areas throughout the Sound during the second period. Best results were obtained in College Fiord and Esther Passage where catches averaged about three and one-third and four and one-half legal king crab (Pandalus platyceros) during sets of 20 and 23 1/2 hours, respectively. No king crab pots were fished during the first period.

The resistance of fish averages 200 to 400 ohms per cubic inch, so that in fresh water electric currents tend to flow through the fish because its resistance is lower, whereas in sea water, electric currents tend to flow around the fish because its resistance is much higher. Therefore, although electric current will flow through sea water more readily than fresh water, it is necessary to have more current (about 80 times as much) to produce similar effects in sea water to those in fresh water.

Power requirements in fresh and salt water. -- Because of the lower resistance of sea water electrical fields spread out more so that even more than 80 times as much power is required to produce conditions in sea water comparative to the production of similar conditions in fresh water.

Practical power values for salt water fishing. --It is not practical to carry generating equipment aboard a vessel that would be necessary to produce enough power to provide continuous a. c. or d. c. current of the magnitude required for fishing at sea. Pulsed a. c. or d. c. current would require as much power unless some type of condenser is used. Only by this means is it possible to use a smaller d. c. power source which charges the condenser up to the required voltage during the comparatively long rest periods between successive pulses.

$$R = \sqrt{\frac{I F W}{G \cdot 4 \pi}} \quad \text{where}$$

Peak pulse current	20,000 amperes	R	= radius of area over which the current will be effective,
Peak pulse voltage	2,000 volts		measured from the anode
Peak recurrent frequency	4-60 cycles/second	I	= peak impulse current in amperes
Pulse duration	1-5 milliseconds	F	= length of fish
Mean power value	60-300 kilowatts	W	= specific resistance of medium
Condenser	40,000 μ Farads charged to 2,000 volts	G	= 'body voltage' of fish, measured from head to tail in volts

Details of electrical installation aboard ship.

Formula for determining area over which Dr. Kreutzer's equipment will be effective. If the anode is near the surface or bottom, the 4π is changed to 2π .

3. 18

CLEANUP MADE EASY THROUGH NEW METHODS

Anonymous

National Provisioner 132, No. 25, 22, 25 (June 18, 1955)

The rapid growth of the meat processing industry has placed new emphasis on sanitation in order to assure top quality processed meats.

Former methods involving a high percentage of manual labor are being discarded in favor of the new mechanical techniques employing 140° F. to 180° F. detergent sprayed under pressure (45 pounds per square inch in one instance). The spray is deposited quickly and forces itself into the soiled surface; thus, hand brushing is greatly minimized. After a suitable soaking period the detergent is spray-rinsed off. It is estimated that certain mechanical hot spray units can clean an area of 12,000 square feet within 30 minutes. This has resulted in tremendous savings in cleaning time, detergent, and water.

Modern detergents are compounded to clean without affecting the metal or base structure. Chemicals that prevent corrosion and etching may be incorporated into the tailored detergent.

"For any large area or equipment cleaning, it is well to investigate the possibilities of mechanical cleaning, which will do a better job and use less time and detergent."

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11, PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Max Patashnik

3. 237

FRYING OILS AND FATS FOR FISH STICKS

Woods, Lyle C. (A. E. Staley Manufacturing Co., Decatur, Illinois)

A talk presented before the New England Fish Technologist's Meeting on February 15, 1955

The oil and fat industry received the hardest job it ever had when the manufacturers of frozen fried sea foods started frying "ice cubes" that were battered and breaded.

Frying Practices. -- Widely different methods are used to fry fish. Variation exists in the types of equipment, filtering materials and methods, kinds of fats and oils, and the frying time and temperature used. Ideal frying practices would include (1) continuous frying equipment with good circulation and no copper or brass in contact with the oil, (2) continuous filtration in order to keep oil in best condition possible at all times, and (3) uniform quality fats and oils from a reliable refiner. In a continuous operation under optimum conditions a good oil may remain suitable for frying for 10 - 14 days. Most processors, however, dispose of their oil when the free fatty acid content reaches 3 percent. Frying conditions for obtaining a properly cooked fish stick with a golden-brown color and an absorption of 9 - 10 percent fat are 90 seconds at 375° F. To get a darker-colored stick with less fat absorption, some manufacturers fry at a higher temperature for a shorter time.

Frying Fats and Oils. -- The melting points and cloud points of shortening and hydrogenated vegetable shortening indicate that both require premelting before they can be added to the frying vats. Liquid frying oils usually have a slightly higher smoke point than solid or semi-solid oils; however, the smoke point will decrease as the oils break down and free fatty acid is released. The liquid oils have slightly higher flash points and fire points than the solid or semi-solid or semi-solid oils. In Boston, the oils range in price from the least expensive corn oil at \$19.25 per drum to the most expensive peanut oil at \$22.75 per drum.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11, PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerd

PLANT SANITATION

FATS FOR FRYING FISH STICKS

3. 19

HOW FOOD ULTRASONICS ARE SHAPING UP

Whitney, R. McL. (University of Illinois, Urbana)
Food Engineering 27, No. 5, 80-82, 159-160 (May 1955)

Ultrasonic waves like light waves may be focused and, since they are directional, controlled. Effects that may be produced include: destruction of bacteria, preparation of emulsions, and depolymerizing of starch and gelatin.

Ultrasound can be produced in several different ways, but the most suitable method for the food processor is with the piezoelectric generator. If certain natural crystals, such as quartz, are cut so that opposite faces are perpendicular to the polar axis, and pressure is applied to these surfaces, charges of opposite sign appear on them. This phenomenon (called piezoelectricity from the Greek word for pressure) is due to changes induced in the spatial relationships of ions in the crystal.

The reciprocal effect is also observed. Application of charges of opposite sign to opposite faces produces an elongation or compression of the crystal in the direction of the polar axis. And, reversing the charges reverses the effect.

If a high frequency alternating potential is applied across its surface, the crystal will attempt to vibrate at its natural frequency or some harmonic. This property of the crystal depends upon its elasticity and thickness. Maximum intensity of vibration is obtained when applied and natural frequencies of the crystal are identical. The high frequency, high potential applied across the quartz crystal is produced in the generator in the same manner as in a radio transmitter. At resonance (natural and applied frequencies identical), amplitude of vibration is proportional to applied voltage. When a source vibrates at from 60 to 16,000 times per second, a sound is heard. When the frequency

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11, PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Reprinted in part

3. 237

WEIGHT CHANGES DURING THE COOKING OF FISH STICKS

Holston, J. (Fish and Wildlife Service, East Boston, Massachusetts)
Commercial Fisheries Review 17, No. 4, 30-33 (April 1955)

Increased competition and output in the fish stick industry are requiring all manufacturers to place close controls on all stages of operation. Waste and consequent losses in time and money are particularly important to management. In addition to weight losses in cooking, other losses may occur during the sawing of sticks from frozen blocks of fish fillets, the batter dipping and breading operation, or the packaging of the finished sticks. Following is a report of results of a pilot-plant scale study made of fish-stick manufacture.

Since the weight and shape of the stick is largely determined by the initial sawing of the sticks, it is necessary to have the sawing blades accurately set to insure a maximum yield per pound. The increase in weight of the sticks due to the adherence of the breading is determined by the consistency of the batter. Once a satisfactory batter is obtained, future mixes should be in the same proportion.

The following factors have been found to determine the weight changes during the cooking processes: (1) cooking time, (2) temperature of cooking oil, (3) composition of the breading material, and, (4) condition of the cooking oil.

Frozen sticks weighing close to 25 grams each were dipped in a batter (6 parts water to 4 parts of commercially prepared dry batter mix). After draining on a screen the sticks were rolled in either a dry commercially prepared breading material or in mixtures of commercial materials containing prepared bread crumbs. The various breaded sticks were then cooked at 360°, 375°, 390°, and 405° F. Cooking times varied from three-fourths of a minute to three minutes. During the first few seconds in the hot oil the sticks increased slightly in weight, evidently due to the absorption of oil by the breading. The sticks left in the hot oil longer than one minute showed losses in weight which increased with cooking time. Table 1 illustrates that the length of cooking time was the most important single factor

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 11, PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Lois Elgin

ULTRASONICS AND FOOD TECHNOLOGY

PROCESSING FISH STICKS

Chemistry of Fats and Oils. -- The vegetable fats and oils are composed of triglycerides or glycerin combined with three molecules of fatty acid. A triglyceride contains about 94-96 percent fatty acid; therefore, its properties depend on the type, percentage, and location of fatty acids present. Fatty acids are either saturated (no double bonds) or unsaturated (double bonds present). The common saturated acids are stearic and palmitic acid; whereas the common unsaturated acids are oleic (one double bond), linoleic (two double bonds), and linolenic acid (three double bonds).

Oils are subjected to oxidation, hydrolyzation, and polymerization in the frying vat. Of the three, oxidation is of primary concern. When oxygen attacks the double bonds of a fatty acid, peroxides are formed. These peroxides are unstable. They break down into aldehydes and related compounds that are the cause of the offensive odor and the taste of rancidity in oils. Antioxidants are chemical substances which, if added to the oil, will interrupt the oxidation reaction and retard the subsequent breakdown of the oil. If the antioxidant has been blended properly with the fresh oil by the refiner and if the oil level in the vat is kept constant by adding more stabilized oil, there should be sufficient stabilizer at all times to protect the oil. The main hydrolyzation reaction is a splitting of the triglycerides by heat and moisture to form free glycerin and free fatty acids. Polymerization, which is not of great importance, is the combining of molecules through double bonds, oxygen linkages, or other means to form larger molecules and eventually chains. The thickening of the oil and the gel formation around the edge of the vat after long usage is indicative of polymerization.

Analytical Methods. -- Tests and values that can be used to check the oil and the finished product are: (1) the active oxygen method (A. O. M.) or swift stability test for the stability of an oil or fat, (2) the peroxide value for a measure of the oxidation which has taken place, (3) the iodine value for a measure of the unsaturation present, and (4) the free fatty-acid content for a measure of the amount of breakdown that has occurred.

in weight loss.

Commercial processors attempt to keep the color of the cooked sticks constant. Higher oil temperatures reduce the time required to obtain the desired color and reduce the weight losses involved in cooking fish sticks.

It has been found that bread crumbs brown more rapidly than do wheat cereal-based mixtures. The rate of browning was further determined by the bread crumb-breading ratio and the oil temperature used. All sticks in this study were considered to have good color except those prepared with a commercial breading material -- which were too light -- and those with bread crumbs alone -- which were too dark.

As seen in table 2, fish sticks prepared from bread crumbs alone undergo a greater loss in weight than those sticks prepared with commercial breading mix. Sticks prepared from mixtures of breading and bread crumbs undergo intermediate weight losses.

The condition of the cooking oil had a small effect on the weight changes. The older and more viscous the cooking oil, the greater the amount of oil absorbed.

By careful control of these factors the processor may achieve little or no weight losses in the cooking preparation of fish sticks.

TABLE 1 - Effect of Cooking Temperature and Time on Weight Changes of Fish Sticks during Deep-Fat Frying

Cooking Time Seconds	Weight Changes (%)		
	350 F	375 F	405 F
45	+2	+1	+3
75	+6	+1	-1
90	+5	-4	-5
120	-6	-9	-6
180	-17	-	-

1/Expressed as parts added or lost in weight by 100 parts of fish.
2/Prepared as parts added or lost in weight by 100 parts of fish.

Table 2 - The Effect of Addition of Bread Crumbs to Standard Breading Material on Weight Changes of Fish Sticks during Deep-Fat Frying

Bread Crumb-Breading Material Ratio ¹	Weight Changes (%)		
	375 F	375 F	405 F
0.0	-5	-1	+3
0.5	-5	-4	-1
0.68	-5	-4	-1
1.0	-10	-11	-2

1/Proportions of bread crumbs added to standard breading material.
2/Cooking time was 90 seconds.
3/Cooking time was 75 seconds.
4/Expressed as parts added or lost in weight by 100 parts of fish.
5/Prepared as parts added or lost in weight by 100 parts of fish.

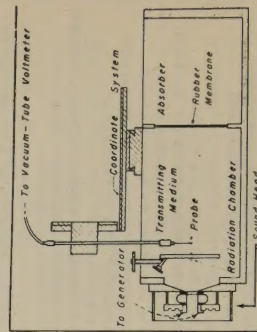
3.19 (Cross Reference: 0.6)

of vibration is 20,000 to 500,000 times per second ultrasound, which is inaudible, results. At these very high frequencies, the distance traveled back and forth (called amplitude of vibration) becomes extremely small, as the accelerations involved are very great.

At a frequency of 300 kilocycles per second, the amplitude of vibration in water is about 0.0008 inches, whereas the acceleration is that of a bullet fired from a rifle. Pressures and tensions of more than 75 p.s.i. may be produced with every vibration. Such conditions literally tear a liquid medium apart to form tiny cavities that are then violently collapsed. This phenomenon is called cavitation.

The ability of ultrasound to produce a very stable, highly dispersed oil-in-water emulsion has suggested, that it may be used in the preparation of mayonnaise and other salad dressings, homogenization of milk, and alteration of the jelling properties of gelatin and pectins by depolymerization. Of greatest interest is its use as a possible substitute for heat sterilization of heat-sensitive materials owing to its ability to destroy bacteria. However, more definite information is needed with regard to the conditions necessary for sterilization.

Work to date at the University of Illinois has been chiefly involved with the development and selection of appropriate instruments and techniques for quantitative control, and the measurement of ultrasonic and bacteriological variables. One of these instruments is the sterilization tank shown here.



3. 33 FISH CANNING IN YUGOSLAVIA Anonymous Food Manufacture 30, No. 7, 285 (July 1955) Sardines were processed for food in Yugoslavia as early at 1860. The first cannery began operation on the Istrian/Dalmatian coast in 1872. S. G. Française de Conserves opened the first of their factories in Yugoslavia in 1879. The traditional French method of frying sardines in olive oil before canning is still practiced. Since 1945 the Yugoslavian fish-canning industry has grown until 15,000 tons of fish, two-thirds of which are canned sardines, are now being canned. These sardines are caught in a comparatively small area at the northern end of the Adriatic Sea, whereas bristling, sprats, and anchovies are caught all around the coast from Trieste to Dubrovnik. Bristling and sprats that are canned in the small plant at Ika on the Istrian coast, are immersed in a salt solution, rodded on racks, and hung in a shower cupboard where they are washed or rinsed. After the fish have been washed they are dried, cooked and smoked. The larger fish that are cured as bristling are processed for 45 minutes in a wood-fired Danish tunnel oven. The smaller fish that are cured as golden sprats for export to America are smoked in a Hamburg-made oven. After they have been smoked, the sprats are decapitated and sorted on trays by a Norwegian machine. These fish are packed in layers in cans by hand. The packed cans are capped and sealed on an Italian machine and sterilized in a 3,500 can capacity retort. Tuna is cut up and packed by hand into round cans each of which holds 114 grams. The filled cans are placed in cases that hold 1,000 cans each and olive oil is added to the cans from an automatic (over)	3. 4 ELECTRO-SMOKE SOLUTION SPEEDS CURING Yoriyama, Y., Nagao, S.; Suto, T. and Takahashi, T. (Tohoku University, Sendai, Japan) Food Engineering 21, No. 4, 105, 210 (April 1955) A new rapid process for smoking meat and fish that offers uniform penetration of the smoke has been achieved with a new smoke-solution produced in an electrode operation. Electrostatic smoking cuts the smoking time from days to hours or even minutes. To smoke by this process the fish are suspended on an insulated rack in the smokehouse and a minimum of 10 kilovolts of alternating current is applied to them through an electrode attached to the insulated rack (figure 1). This method produces an electrostatic smoke deposit on the skin of the fish. With higher voltages and greater distances between the racked fish, the uniformity of the coating can be increased. The time required for smoking can be increased by using direct current instead of alternating current. With the direct current method the screen rack is used as a negative electrode, and the fish are used as a positive electrode. Electrostatic smoking produces a better sterilization of the fish surface than conventional smoking. This sterilizing effect is believed to be due to the conversion of methanol in the smoke to nascent aldehyde. To produce the new electro-smoke solution for smoke curing, smoke from moist sawdust is passed through a cylindrical water-cooled electrode. The 100 kilovolt direct current in this electrode causes the smoke and vapor to condense and drop into a well (figure 2). Water is then added to the condensed smoke and vapor, and the soluble components are dissolved to form an 8 to 10 Baumé smoke-solution. This solution is transparent, light brown in color, very stable, and has the flavor characteristics of smoked food. Fish immersed in a 3 to 4 Baumé dilution of this smoke solution can be cured in a matter of hours. Smoke penetration is uniform. Small amounts of this liquid put into cans of raw meat or fish before processing will yield a canned, smoked-flavored product. Since the electrostatic method of curing or (over)
---	---

3. 8 (Cross Reference: 1. 20)

6. In 8 out of 9 cases viscous colonies were isolated from floor sweepings gathered in October in a factory where sugar-salted herring were repacked earlier in the season. Viscous colonies could not be isolated from similar samples taken from exactly the same place during the middle of March.

7. No viscous colonies were found in the sputum from 18 employees tested on two different occasions within three weeks.

Storage temperature, osmotic pressure, pH, redox-potential, chemical preservatives, antibiotics (penicillin), enzyme poisons, and spices were studied for methods to prevent the formation of viscous brine. If the cured herring were at 0° C. at an early stage before bacteria had increased, the formation of polysaccharides and bacterial growth were extremely slow. Osmotic pressure was shown to be a factor in that the period of viscous formation diminished with both higher and lower salt concentrations. By radically decreasing the pH of the brine with the addition of organic acids, the formation of viscous brine was avoided; however, the product characteristics were altered. Ascorbic acid was added to change the redox-potential and was effective in preventing viscous formation; however, the large amounts of acid required made it uneconomical. No chemical preservatives were successful in tests with varying concentrations of legally permitted additives. Penicillin was added to a concentration of 5 million I. U. per barrel of herring but was ineffective in preventing viscous brine formation. Cobalt sulfate was tried as an enzyme poison but was ineffective. Of the various spices and spice oils tried, ground mustard seed was found to be the most effective. Further tests showed that the bacteriostatic agent was present in the mustard husk oil, which was effective when added in an amount of 0.4 to 0.5 kilo per barrel of herring. The price of the mustard oil was one-sixth that of the ground white mustard.

No satisfactory methods were found to reduce the viscosity of an already formed viscous brine. The best procedures for its prevention appeared to be the addition of mustard oil or the storage of the herring at 0° C.

3. 33 (Cross Reference: 1. 0149)

measure. After the cans of tuna have been oiled they are capped, sealed, and cleaned by hand in tubs full of bran before they are sterilized. Tuna scraps are mixed with vegetables, seasoned, packed in large cans and sold as a speciality of Ika.

Anchovies are salt-cured before they are canned. The fresh anchovies are packed in wooden tubs between layers of salt and weighted down under a loose-fitting lid that rests on top of the salt and anchovies. After the anchovies have been in salt in tubs for 6 to 12 months they are ready for canning. Scampi that are caught along this coast are also canned at Ika.

3. 5

Table 2. Browning of Salt Fish During Storage at 10° to 12° C.

Type of salt	15 days in salt	22 days in salt	29 days in salt	Type of fish and
(A) Solar (1)	No browning	No browning	No browning	1 Fresh North Sea (1 day only)
(B) Pure (A.R.)	No browning	No browning	No browning	1 Fresh North Sea (1 day only)
(C) Solar (2)	No browning	No browning	No browning	14 days (1) North Sea
(D) Manufactured vacuum (A)	No browning	No browning	No browning	14 days (1) North Sea
(E) Manufactured vacuum (B)	No browning	No browning	No browning	14 days (1) North Sea
(F) Solar (3)	No browning	No browning	No browning	14 days (1) North Sea
(G) Solar (4)	No browning	No browning	No browning	14 days (1) North Sea
(H) Pure (A.R.)	No browning	No browning	No browning	14 days (1) North Sea
(I) Manufactured vacuum (A)	No browning	No browning	No browning	14 days (1) North Sea
(J) Manufactured vacuum (B)	No browning	No browning	No browning	14 days (1) North Sea
(K) Solar (5)	No browning	No browning	No browning	14 days (1) North Sea
(L) Manufactured open pan	No browning	No browning	No browning	14 days (1) North Sea
(M) Solar (6)	No browning	No browning	No browning	14 days (1) North Sea
(N) Solar (7)	No browning	No browning	No browning	14 days (1) North Sea
(O) Solar (8)	No browning	No browning	No browning	14 days (1) North Sea
(P) Solar (9)	No browning	No browning	No browning	14 days (1) North Sea
(Q) Solar (10)	No browning	No browning	No browning	14 days (1) North Sea
(R) Solar (11)	No browning	No browning	No browning	14 days (1) North Sea
(S) Solar (12)	No browning	No browning	No browning	14 days (1) North Sea
(T) Solar (13)	No browning	No browning	No browning	14 days (1) North Sea
(U) Solar (14)	No browning	No browning	No browning	14 days (1) North Sea
(V) Solar (15)	No browning	No browning	No browning	14 days (1) North Sea
(W) Solar (16)	No browning	No browning	No browning	14 days (1) North Sea
(X) Solar (17)	No browning	No browning	No browning	14 days (1) North Sea
(Y) Solar (18)	No browning	No browning	No browning	14 days (1) North Sea
(Z) Solar (19)	No browning	No browning	No browning	14 days (1) North Sea
(AA) Solar (20)	No browning	No browning	No browning	14 days (1) North Sea
(AB) Solar (21)	No browning	No browning	No browning	14 days (1) North Sea
(AC) Solar (22)	No browning	No browning	No browning	14 days (1) North Sea
(AD) Solar (23)	No browning	No browning	No browning	14 days (1) North Sea
(AE) Solar (24)	No browning	No browning	No browning	14 days (1) North Sea
(AF) Solar (25)	No browning	No browning	No browning	14 days (1) North Sea
(AG) Solar (26)	No browning	No browning	No browning	14 days (1) North Sea
(AH) Solar (27)	No browning	No browning	No browning	14 days (1) North Sea
(AI) Solar (28)	No browning	No browning	No browning	14 days (1) North Sea
(AJ) Solar (29)	No browning	No browning	No browning	14 days (1) North Sea
(AK) Solar (30)	No browning	No browning	No browning	14 days (1) North Sea
(AL) Solar (31)	No browning	No browning	No browning	14 days (1) North Sea
(AM) Solar (32)	No browning	No browning	No browning	14 days (1) North Sea
(AN) Solar (33)	No browning	No browning	No browning	14 days (1) North Sea
(AO) Solar (34)	No browning	No browning	No browning	14 days (1) North Sea
(AP) Solar (35)	No browning	No browning	No browning	14 days (1) North Sea
(AQ) Solar (36)	No browning	No browning	No browning	14 days (1) North Sea
(AR) Solar (37)	No browning	No browning	No browning	14 days (1) North Sea
(AS) Solar (38)	No browning	No browning	No browning	14 days (1) North Sea
(AT) Solar (39)	No browning	No browning	No browning	14 days (1) North Sea
(AU) Solar (40)	No browning	No browning	No browning	14 days (1) North Sea
(AV) Solar (41)	No browning	No browning	No browning	14 days (1) North Sea
(AW) Solar (42)	No browning	No browning	No browning	14 days (1) North Sea
(AX) Solar (43)	No browning	No browning	No browning	14 days (1) North Sea
(AY) Solar (44)	No browning	No browning	No browning	14 days (1) North Sea
(AZ) Solar (45)	No browning	No browning	No browning	14 days (1) North Sea
(BA) Solar (46)	No browning	No browning	No browning	14 days (1) North Sea
(BB) Solar (47)	No browning	No browning	No browning	14 days (1) North Sea
(BC) Solar (48)	No browning	No browning	No browning	14 days (1) North Sea
(BD) Solar (49)	No browning	No browning	No browning	14 days (1) North Sea
(BE) Solar (50)	No browning	No browning	No browning	14 days (1) North Sea
(BF) Solar (51)	No browning	No browning	No browning	14 days (1) North Sea
(BG) Solar (52)	No browning	No browning	No browning	14 days (1) North Sea
(BH) Solar (53)	No browning	No browning	No browning	14 days (1) North Sea
(BI) Solar (54)	No browning	No browning	No browning	14 days (1) North Sea
(BJ) Solar (55)	No browning	No browning	No browning	14 days (1) North Sea
(BK) Solar (56)	No browning	No browning	No browning	14 days (1) North Sea
(BL) Solar (57)	No browning	No browning	No browning	14 days (1) North Sea
(BM) Solar (58)	No browning	No browning	No browning	14 days (1) North Sea
(BN) Solar (59)	No browning	No browning	No browning	14 days (1) North Sea
(BO) Solar (60)	No browning	No browning	No browning	14 days (1) North Sea
(BP) Solar (61)	No browning	No browning	No browning	14 days (1) North Sea
(BQ) Solar (62)	No browning	No browning	No browning	14 days (1) North Sea
(BR) Solar (63)	No browning	No browning	No browning	14 days (1) North Sea
(BS) Solar (64)	No browning	No browning	No browning	14 days (1) North Sea
(BT) Solar (65)	No browning	No browning	No browning	14 days (1) North Sea
(BU) Solar (66)	No browning	No browning	No browning	14 days (1) North Sea
(BV) Solar (67)	No browning	No browning	No browning	14 days (1) North Sea
(BW) Solar (68)	No browning	No browning	No browning	14 days (1) North Sea
(BX) Solar (69)	No browning	No browning	No browning	14 days (1) North Sea
(BY) Solar (70)	No browning	No browning	No browning	14 days (1) North Sea
(BZ) Solar (71)	No browning	No browning	No browning	14 days (1) North Sea
(CA) Solar (72)	No browning	No browning	No browning	14 days (1) North Sea
(CB) Solar (73)	No browning	No browning	No browning	14 days (1) North Sea
(CC) Solar (74)	No browning	No browning	No browning	14 days (1) North Sea
(CD) Solar (75)	No browning	No browning	No browning	14 days (1) North Sea
(CE) Solar (76)	No browning	No browning	No browning	14 days (1) North Sea
(CF) Solar (77)	No browning	No browning	No browning	14 days (1) North Sea
(CG) Solar (78)	No browning	No browning	No browning	14 days (1) North Sea
(CH) Solar (79)	No browning	No browning	No browning	14 days (1) North Sea
(CI) Solar (80)	No browning	No browning	No browning	14 days (1) North Sea
(CJ) Solar (81)	No browning	No browning	No browning	14 days (1) North Sea
(CK) Solar (82)	No browning	No browning	No browning	14 days (1) North Sea
(CL) Solar (83)	No browning	No browning	No browning	14 days (1) North Sea
(CM) Solar (84)	No browning	No browning	No browning	14 days (1) North Sea
(CN) Solar (85)	No browning	No browning	No browning	14 days (1) North Sea
(CO) Solar (86)	No browning	No browning	No browning	14 days (1) North Sea
(CP) Solar (87)	No browning	No browning	No browning	14 days (1) North Sea
(CQ) Solar (88)	No browning	No browning	No browning	14 days (1) North Sea
(CR) Solar (89)	No browning	No browning	No browning	14 days (1) North Sea
(CS) Solar (90)	No browning	No browning	No browning	14 days (1) North Sea
(CT) Solar (91)	No browning	No browning	No browning	14 days (1) North Sea
(CU) Solar (92)	No browning	No browning	No browning	14 days (1) North Sea
(CV) Solar (93)	No browning	No browning	No browning	14 days (1) North Sea
(CW) Solar (94)	No browning	No browning	No browning	14 days (1) North Sea
(CX) Solar (95)	No browning	No browning	No browning	14 days (1) North Sea
(CY) Solar (96)	No browning	No browning	No browning	14 days (1) North Sea
(CZ) Solar (97)	No browning	No browning	No browning	14 days (1) North Sea
(DA) Solar (98)	No browning	No browning	No browning	14 days (1) North Sea
(DB) Solar (99)	No browning	No browning	No browning	14 days (1) North Sea
(DC) Solar (100)	No browning	No browning	No browning	14 days (1) North Sea

* Not examined.

3. 4

smoke-solution treatment is very rapid, the smoked fish do not receive the proper amount of drying. Additional drying of the fish is necessary if smoking alone is used as the preservative.

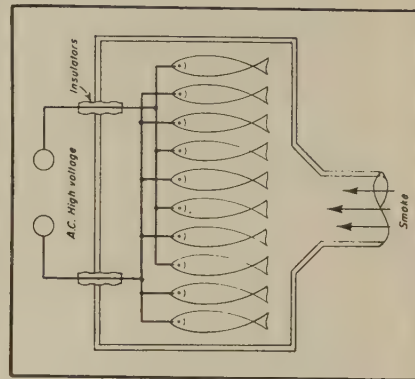


Figure 1

... FAST ELECTRO COATING.

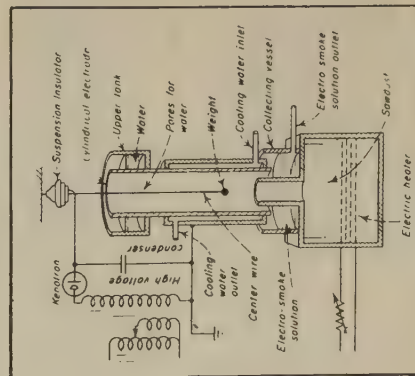


Figure 2

SOLUTION MAKER

Kraft paper sacks and held at -17.5°C . until completion of the initial vitamin A analyses. Then the samples were placed in storage at a temperature of $3^{\circ} \pm 1.5^{\circ}\text{C}$. for 150 days. Vitamin A was determined by the Carr-Price colorimetric reaction with 25-percent antimony trichloride initially and at 30-day intervals throughout the 150-day storage period.

Results. -- The vitamin A losses that occurred in diets 1, 2, and 3 are shown in table 2 below.

TABLE 2. Vitamin A losses during storage of different diets containing different vitamin A supplements
(Storage at 47°C.)

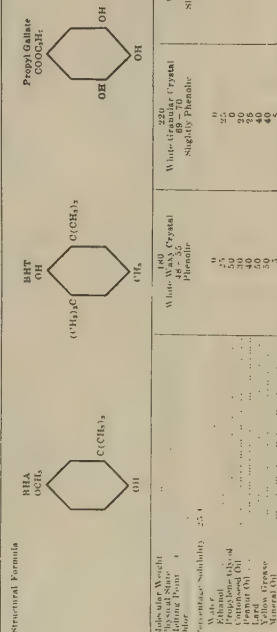
Vitamin A supplements and diet modifications	Percent loss in 30 days storage				Percent loss in 150 days storage			
	Diet		Diet		Diet		Diet	
	1	2	3		1	2	3	
Supplement No. 1 (Goul liver oil)								
a	4.7	8.4	7.6		52.1	45.9	54.8	
b	8.2	8.3	7.9		58.6	47.6	50.6	
c	5.7	7.9	11.6		57.2	47.4	50.1	
d	20.6	19.5	36.9		72.9	61.9	93.0	
Supplement No. 2 (dry-fat powder)								
a	10.6	7.7	12.8		48.6	49.3	44.9	
b	10.4	7.6	9.4		49.0	50.5	45.5	
c	15.3	7.6	17.7		52.6	50.5	55.8	
d	17.9	19.2	31.7		71.1	66.6	88.2	
Supplement No. 3 (wax-sealed pellets)								
a	00	10.1	3.1		12.2	21.7	5.7	
b	00	7.9	2.2		18.9	23.0	6.6	
c	00	7.9	2.2		25.5	28.5	10.5	
d	00	10.1	4.8		28.3	28.3	34.4	

TABLE III

Solubility Data on Fatty Acids in Various Solvents
(All values in grams acid per 100 g. solution)

Temp.	Solvent					Normal Viscosity
	Methanol	Ethyl Acetate	Diethyl Ether	Acetone	Toluene	
Stearic Acid						
10°	0.28	0.58	2.40	0.54	0.790	0.040
0°	0.090	0.13	0.95	0.11	0.090	0.010
-10°	0.080	0.10	0.82	0.10	0.075	0.010
-20°	0.011	0.006	0.15	0.005	0.003	...
-30°	...	...	0.03	...	...	...
Oleic Acid						
20°	4.02	5.95	...	5.29	...	2.25
10°	0.66	1.00	...	0.88	1.12	0.66
0°	0.29	0.42	0.75	0.323	0.415	0.175
-10°	0.10	0.29	1.00	0.17	0.28	0.103
-20°	0.03	0.087	0.41	0.057	0.075	0.015
-30°	...	...	0.21	...	...	...
Klaidic Acid						
0°	...	...	...	...	...	0.59
-10°	0.22	...	...	...	0.46	0.19
-20°	0.18	0.28	1.40	0.28	0.20	0.069
-30°	0.084	0.10	0.80	0.092	0.058	0.019
-40°	0.020	0.020	0.10	0.018	0.013	0.007
-50°	0.010	0.008	0.10	0.009	...	...
Linoleic Acid						
-50°	3.10	4.40	...	3.20	...	0.98
-40°	0.30	1.38	...	0.70	...	0.29
-30°	0.25	0.39	...	0.35	...	0.04
Arachidic Acid						
10°	0.080	0.14	0.80	0.13	0.12	0.028
0°	0.028	0.038	...	0.05	0.072	0.010
Stearic Acid						
-20°	0.80	1.30	...	1.10	...	0.24
-30°	0.35	0.80	3.90	0.54	1.10	0.45
-40°	0.15	0.30	1.50	0.27	0.60	0.08
-50°	0.06	0.11	0.58	0.12	0.07	0.04
-60°	0.02	0.02	0.22	0.05	...	0.01
Tribenzoic Acid						
10°	...	...	...	...	...	0.50
-10°	0.48	0.73	3.52	0.78	0.98	0.13
-20°	0.18	0.30	1.68	0.31	0.23	0.040
-30°	0.080	0.11	0.70	0.11	0.068	0.008
-40°	0.018	0.040	0.31	0.035	0.008	...
-50°	...	...	...	...	...	...
Petrolsulfonic Acid						
0°	0.50	...	...	...	1.40	0.20
-10°	0.02	0.36	...	0.32	0.19	0.030
-20°	0.082	0.14	0.13	0.13	0.40	0.008
-30°	0.028	0.045	0.15	0.050	0.020	0.002
-40°	0.010	0.010	0.10	0.019	0.008	...
-50°	...	...	0.070	...	...	...
Stearic Acid						
0°	0.65	1.15	4.40	1.28	1.70	0.65
-10°	0.25	0.45	2.00	0.58	0.80	0.10
-20°	0.103	0.17	0.78	0.19	0.083	0.008
-40°	0.040	0.040	0.20	0.070	0.018	...
Palmitic Acid						
0°	1.30	...	...	1.60	1.41	0.30
-10°	0.48	0.52	0.95	0.86	0.86	0.08
-20°	0.19	0.31	1.35	0.55	0.38	0.02
-30°	0.080	0.080	0.58	0.10	0.18	0.008
-40°	...	0.018	0.21	0.038	...	...
Oleic Acid						
10°	0.019	0.005	0.46	0.050	0.040	0.012
0°	0.007	0.018	0.18	0.014	0.010	...
-10°	0.002	0.004	0.068	0.004	0.002	...
Erucic Acid						
-10°	0.49	...	...	...	...	0.35
-20°	0.19	0.31	...	0.11	0.41	0.11
-30°	0.068	0.11	1.20	0.10	0.18	0.030
-40°	0.024	0.040	0.49	0.037	0.044	0.008
-50°	0.007	...	0.18	...	...	...
Bromostearic Acid						
10°	0.27	0.70	...	0.68	0.82	0.20
0°	0.084	0.28	...	0.24	0.18	0.038
-10°	0.030	0.090	0.72	0.08	0.050	0.010
-20°	0.010	0.010	0.20	0.024	0.013	0.003
-30°	...	...	0.08	...	...	...

Fig. 1. A comparison of the structure of physical properties of some phenolic antioxidants.



5. 112	THE STABILITY OF VITAMIN A IN MIXED FEEDS AND PREMIXES Reid, B. L.; Daugherty, H. K.; and Couch, J. R. Poultry Science 34, No. 3, 603-608 (May 1955)	Studies were made of the effect of storage on vitamin A stability in several types of mixed feeds when the vitamin was supplied as a dry stabilized concentrate and as a fish liver oil concentrate. The effect of storage of the feed for various lengths of time on the growth of chicks and poult fed these diets, and the storage of vitamin A in the livers of the birds as a measure of the availability of the vitamin were also determined. The results of the storage tests are shown in table 2.	At the end of the 16-week storage period, 87 to 98 percent of the vitamin A remained in the stabilized concentrated feeds and premixes. The results with the mineralized vitamin premix and the milk replacer indicated the effect of mineral content on vitamin A stability. The loss from fish-liver oil was quite rapid, while the dry stabilized concentrate appeared to be stable under the same conditions. The physical characteristics of the ration had little stabilizing effect on the vitamin A. Five-percent meat scraps in the hog supplement failed to have a detrimental effect on the vitamin A content and in this case, the percentage loss from fish-liver oil concentrate was less than from any of the rations tested.	The temperature of storage had a marked effect on the stability of vitamin A, but the concentration of the vitamin A supplement apparently was of little importance.	The results of chemical studies of vitamin A and of biological reactions showed good agreement. The results of the chick tests are recorded in table 4.	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: Neva Karrick
5. 41	VITAMIN B ₁₂ DISTRIBUTION IN NATURE Anonymous Nutrition Reviews 13, No. 4, 113-115 (April 1955)	Vitamin B ₁₂ or what was once called the "animal protein factor" is widely distributed in foods of animal origin and products derived from these foods. The best sources of vitamin B ₁₂ , however, are the dried cells of a variety of bacteria or fungi. These dried cell residues are widely used in animal feeds.	Normal animal tissues do not synthesize vitamin B ₁₂ . Instead they derive their vitamin B ₁₂ from the animal diet, which may contain vitamin B ₁₂ from microbial sources directly or indirectly, or from synthesis by microorganisms in the digestive tract or rumen. Prior to the identification of vitamin B ₁₂ workers demonstrated that unidentified factor activity (vitamin B ₁₂) was absent or low in plant materials.	The discovery of a relatively rich source of vitamin B ₁₂ in various species of seaweed or algae was of major importance because seaweed could conceivably become an inexpensive source of vitamin B ₁₂ . Seaweed, incidentally, is the highest plant on the evolutionary scale that is known to contain appreciable quantities of vitamin B ₁₂ . Erickson and Lewis (1953) showed that seaweed cannot synthesize vitamin B ₁₂ . Instead, closely associated bacteria produce vitamin B ₁₂ that is concentrated by the seaweed. Of 25 species of marine algae investigated, 23 species were found to contain vitamin B ₁₂ in quantities ranging from 0.004 to 2.8 micrograms per gram on a dry weight basis. Evidence was found for at least 4 types of vitamin B ₁₂ in algae one of which had properties differing from the known types. Green algae were richer in vitamin B ₁₂ than either the red or the brown algae.	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: Martin Heerdt	
5. 7	STUDIES ON ENCEPHALOMALACIA IN THE CHICK. 2. THE PROTECTIVE ACTION OF DIPHENYL-P-PHENYLENEDIAMINE AGAINST ENCEPHALOMALACIA Singsen, E. P.; Bunnell, R. H.; Matterson, L. D.; Kozeff, Anna; and Jungherr, E. L. (University of Connecticut, Storrs, Connecticut) Poultry Science 34, No. 2, 262-271 (March 1955)	The experiments described below were conducted to study the effect of fish oil, d-alpha-tocopheryl acetate, and several other substances including the antioxidant diphenyl-p-phenylenediamine on growth, mortality, blood-tocopheryl levels, and incidence of encephalomalacia in vitamin E-deficient chicks.	Experimental materials and methods. -- The normal chick ration and the vitamin E low basal rations previously reported by Singsen et al. (1954) were used. The basal breeder ration, which is known to be deficient in several B-complex vitamins, contained 1.89-percent total fat at 2.54 milligrams of total tocopherols per 100 grams of ration. Chicks from hens that had received the breeder ration and had very low levels of blood tocopherols at hatching time will be referred to as Vitamin E deficient chicks. The basal chick ration contained approximately 2 percent of total fat, 23-percent protein and averaged 2.02 milligrams of total tocopherols per 100 grams of ration. The fish oil fed as a stress factor was a good quality, fresh commercial brand of vitamin A and D feeding oil having an iodine number of 161.8. The vitamin E supplement used was a commercial product consisting of d-alpha-tocopheryl acetate adsorbed on defatted soybean meal and standardized to contain 20,000 I. U. of vitamin E per pound.	All chicks, both vitamin E deficient and normal, were the progeny of Barred Plymouth Rock pullets mated to either Rhode Island Red or New Hampshire cockerels. From 14 to 20 chicks were used in each lot. All experiments were ended when the chicks were 28 days old. Blood tocopherol	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: Martin Heerdt	
6. 190	FISH PRODUCTS... THE WHY OF QUALITY FOR FEEDS Konen, Harry J. (Uncle Johnny Mills, Houston, Texas) Feedstuffs 27, No. 28, 72-73, 75-76 (June 25, 1955)	Fish meal contains a high percentage of well balanced protein. With chicks, for example, fish meal -- analytically at least -- is one of the few sources of protein that will support normal growth by itself. Fish meal, which contains a complete source of essential amino acids, can make an important contribution to the nutritional balance and economy of all critical rations concerned with growth. Fish products and fish solubles in particular have gained wide recognition as sources of vitamin B ₁₂ and other B-complex vitamins. Fish meal also supplies a liberal quantity of calcium, available phosphorus, and trace minerals.	Unidentified factors continue to be of interest to investigators in the field of animal nutrition. Fish products have consistently proved to be excellent practical sources of the unknown factors required for optimum growth. Of current interest to the feed manufacturer and to the fish processor as well are the developments which link environment and the drug content of rations to the need for unidentified growth factor supplementation.	Work at Texas A & M College by Couch et al. has demonstrated that chick response to sources of unidentified growth factors, can be greatly enhanced under conditions where a so-called "high disease level" may exist. Combs et al. at the University of Maryland, who have conducted a number of experiments with broilers, have shown that the addition of arsenic acid to a ration containing penicillin reduces intestinal synthesis of the whey factor and the fish factor to a point that the chick becomes more dependent upon the diet for sources of these factors. Combs' data gives support to the theory that more complete fortification of rations to which various drugs have been added is desirable in order to meet	(over)	COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: Martin Heerdt	

VITAMIN A IN FEEDS

NUTRITIVE VALUE OF FISH MEAL

VITAMIN B₁₂ IN NATURE

VITAMIN E IN CHICK DIET

the requirements of the animal. The same group of workers at the University of Maryland caused widespread interest when they grew 3-pound broilers in seven and one-half weeks on less than 5 pounds of feed per bird. Their conversion of feed into 62.5 pounds of meat is an achievement which may not be equaled in commercial practice in the foreseeable future. This record, however, does have highly practical implications in broiler feed formulation.

According to Combs and Romoser, the problem of developing the most effective practical ration at any given energy level is primarily concerned with the protein-energy ratio. For best results this ratio is approximately 42 and 47 calories of productive energy for each percent of protein in the broiler starter and finisher feeds, respectively. Concentrations of vitamins and minerals in feeds can be increased easily if necessary at relatively low cost, but the same definite amino acid pattern must be maintained for each increase in total protein if the protein-energy ratio is to remain effective.

Baldini and Rosenberg's experiments show that the optimum methionine content of a broiler diet is a straight-line function of the energy level. These workers also were able to establish a similar relationship between production energy and feed efficiency in those diets where methionine was not a limiting factor. By increasing the energy level from 908 to 980 calories and by adding 1 to 1.5 pounds of methionine per ton, Baldini and Rosenberg improved growth on their 21-percent protein basal ration from 3.53 pounds for the mixed sexes at 9 weeks, 6 days to 3.71 pounds, and feed conversion from 2.64 to 2.45 pounds of feed per pound of meat.

Additions of 5- to 10-percent fish meal to the basal diet improved the concentration of the usually critical amino acids, lysine and methionine.

5. 7 (Cross Reference: 4. 62)

determinations were made according to the method of Quaife et al. (1949) usually on a pooled sample drawn from six chicks per lot. No disease conditions were diagnosed in the course of these experiments. A total of 299 brains were examined, and 217 or 72.6 percent were diagnosed as positive encephalomalacia. The data on the incidence of encephalomalacia refers specifically to the specimens examined histologically and not to the chicks that died.

Conclusions. --The following conclusions may be drawn from the data obtained: (1) The chicks' early requirement for vitamin E for normal growth and low mortality, in the absence of dietary stress, is less than 3 I.U. per pound of ration; (2) A vitamin E low condition, per se, in chicks does not produce encephalomalacia; (3) A high mortality from encephalomalacia was induced by the addition of fish oil to the diet; (4) The mortality from encephalomalacia, caused by adding 2-percent fish oil to the ration, could be prevented completely by adding 11 I.U. of vitamin E per pound of ration; (5) The vitamin E requirement of the chick is not a fixed or specific amount. Instead, it varies directly with the amount of dietary stress present in the ration. Between 7 and 11 I.U. of vitamin E per pound of diet probably is sufficient to prevent the appearance of encephalomalacia under most field conditions; (6) The mortality from encephalomalacia induced by adding two percent of fish oil to the ration could be completely prevented by adding 0.025-percent DPPD to the ration. Only four cases of encephalomalacia appeared when 0.0125-percent DPPD was fed, however, 0.0125-percent DPPD probably would prevent the appearance of encephalomalacia under most field conditions; (7) The data suggests that vitamin E functions as a general biological antioxidant to prevent encephalomalacia and that DPPD and other substances exerting a protective action against chick encephalomalacia function in a parallel manner.

5. 41 (Cross Reference: 6. 3)

Of 34 bacterial cultures closely associated with seaweed and isolated by the use of several types of mediums, 24 partially identified cultures were able to synthesize significant amounts of vitamin B₁₂ (0.005 to 0.14 micrograms per milliliter of broth). The bacteria found in these cultures were facultative motile rod aerobes; and they produce the same type of vitamin B₁₂ factors that occurred in the marine algae, as determined by bioautographic separation. These bacteria produced a better yield of vitamin B₁₂ active substances if they were grown together than when grown separately.

Vitamin B₁₂ activity could not be detected in brackish water that had been concentrated 1000 times or adsorbed on charcoal from seawater. Seaweeds grown in tanks under relatively sterile conditions were unable to produce vitamin B₁₂. On this basis Scott and Ericson finally concluded that the original source of vitamin B₁₂ in seaweed was the bacteria living epiphytically on the algae. The vitamin B₁₂ that is produced by these bacteria is adsorbed on the cell wall and concentrated from 20 to 120 times by the marine algae. None of this vitamin is actually needed by the algae.

STABILITY OF VITAMIN A

TABLE 2. The effect of different rations on the vitamin A stability using a stabilized dry concentrate and fish liver oil as sources of the vitamin (stored under -20 degree conditions)

Ration	Vitamin A Source	Percent vitamin A remaining			
		1 (93-75)	2 (94-76)	3 (96-75)	4 (98-66)
Chick Starter	S C ¹	95	95	96	96
	F L O ²	27	84	45	27
Turkey Starter	S C	98	101	99	93
	F L O	48	33	27	27
Beef Cattle Supplement	S C	102	104	96	88
	F L O	99	60	46	44
Hog Supplement	S C	91	86	71	87
	F L O	74	71	51	51
Milk Replacer	S C	101	101	105	103
	F L O	25	13	17	16
Dog Biscuits	S C	98	97	110	98
	F L O	39	37	46	35
Vitamin Concentrate	S C	89	100	99	97
	F L O	69	49	60	46
Vitamin Concentrate (Mineralized)	S C	93	104	107	88
	F L O	13	13	8	2

¹ Average temperature in °F. for the storage period (maximum: minimum).

² Values are given as percent remaining.

³ Stabilized concentrate.

⁴ Fish liver oil.

STABILITY OF VITAMIN A

TABLE 4. Biological availability and stability of vitamin A as measured by chick growth

Diet	Average wt. of chicks (gms.)						Feed efficiency	Vitamin A in liver I.U./gm
	Weeks							
	0	2	4	6	8	10		
Control (no vitamin A)	40	91	218	249	296			
	(50) ¹	(47)	(43)	(55)	(9)	(0)		
Stabilized A 2,000 I.U./lb.	41	100	206	446	662	924	2.86	24.8
	(50)	(49)	(47)	(47)	(46)	(46)		
Fish oil 2,000 I.U./lb.	42	96	241	285	415			
	(50)	(47)	(37)	(17)	(2)	(0)		
Control	40	88	112					
	(50)	(49)	(12)	(0)				
Stabilized A	40	94	258	430	650	903	2.90	22.3
	(50)	(49)	(46)	(44)	(37)	(37)		
Fish oil	40	92	130					
	(50)	(47)	(23)	(0)				
Control	35	86						
	(50)	(38)	(0)					
Stabilized A	36	96	201	410	595	886	2.81	26.3
	(50)	(50)	(48)	(44)	(43)	(43)		
Fish oil	36	91						
	(50)	(38)	(0)					

6. 190 BETTER FOODS FROM BETTER FEEDS

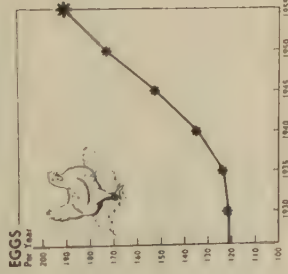
Anonymous

Feedstuffs 27, No. 21, 1a-16a (May 21, 1955)

The contribution of formula feeds to more efficient and profitable agriculture has been summarized in the following progress reports:

1. You measure increased animal agriculture efficiency in millions (Graph, over)
2. Biddy lays another 69 eggs. (Graph, over)
3. Three pounds of broiler on 6 pounds of feed.
4. Knocking 38 percent off the turkey feed bill.
5. An extra 22 pounds of pork.

EGG PRODUCTION PER BIRD *



(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

Reprinted in part

6. 71 DOES IT PAY TO SAVE GLANDS?

Anonymous

National Provisioner 133, No. 10, 12-14, 16, 17 (September 3, 1955)

The profits from saving the glands from food animals can be measured both in dollars and in humanitarian values.

According to one of the major processors of meat glands, a packer that slaughters 2000 head of hogs per week can net, at the current gland market prices, approximately \$165.50 per week or \$8,606 per year.

Of equal or greater importance are the contributions to the nation's health. Animal glands are the only raw materials for many medications including the various thyroid compounds.

If it is to be profitable the gland-saving program should be organized on a gland-grouping system. The price of a specific type of gland will fluctuate due to various medical factors, however, if the packer is saving several glands at one time he is generally assured a profitable outlet for his products.

Current prices make profitable the saving of pituitary glands, thyroid glands, and pancreas from beef and hogs and the bile from beef.

Gland saving does not necessitate purchase of major equipment nor does it call for specialized skill on the part of employees. By working it in with other jobs it rarely requires an extra man to effect a gland-saving program in a meat-packing plant.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

NUTRITIVE VALUE OF MEAL AND SOLUBLES

VALUE OF SAVING GLANDS

EXTRACTION OF IRISH MOSS

PAPER-ELECTROPHORESIS OF PROTEIN

6. 3 THEORY AND APPLICATION OF CONTINUOUS PRESSURE FILTRATION TO THE EXTRACTION OF IRISH MOSS

Dahlstrom, D. A. (EIMCO Corporation Laboratories, Palatine, Illinois); Heck, Walter; Oeri, Stanley M; and Singleton, Andrew (Kraft Foods Co. Research Laboratories, Glenview, Illinois)

Food Technology 9, No. 6, 303-308 (June 1955)

The application of continuous pressure filtration in the hot water extraction of Irish moss (*Chondrus crispus*) is described. The problems in filtration are caused by high viscosity of the carrageenin solution, the gelatinous nature of the residue, and the necessity for producing a highly clarified extract. Pilot tests were conducted with a pressure leaf filter arranged so that the rotary cycle could be simulated. Based on the tests, the following requirements were found to be essential in a continuous pressure filter installation:

1. Required operating temperature is 200-205° F.
2. Fifty per cent submergence of the filter drum with 3 m. p. r. is required as the probable average drum speed.
3. A special Orlon fabric is the optimum filter media which will yield both the desired filtrate clarity and filtration rate. However, if cloth life is too short because of the high operating temperatures, a very close weave Monel screen can be substituted at a higher initial cost.
4. No agitation of the feed slurry is required as the solids do not settle out upon standing.
5. Optimum operating pressure is 40 lbs. /in.² gage. This requires designing for an operating pressure of 60 lbs. /in.²
6. Feed level in the pressure shell should be automatically controlled to assure a relatively constant submergence of the drum.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: John A. Dassow

7. 522 PAPER-ELECTROPHORETIC ANALYSIS OF PROTEIN EXTRACTED AT LOW IONIC STRENGTH FROM FISH SKELETAL MUSCLE

Nikkila, O. E. and Linko, R. R.

Biochemical Journal 60, No. 2, 242 (June 1955)

In spite of the inexpensive apparatus and simple procedure, filter-paper electrophoresis as employed for muscle-protein studies offers advantages in some respects over the classical methods employing free solution. This method of paper electrophoresis permits the use of smaller samples of lower concentration and the analysis of several samples at the same time. In addition, it is possible to avoid the inaccuracies associated with the sensitive optical methods employed in free electrophoresis when the solution is poorly translucent.

Muscle extracts of 10 different species of fish were examined by the paper-electrophoretic method in sodium phosphate buffer at $\mu = 0.05$ and pH 7.55 at room temperature. In general, the run with the phosphate buffer gave a good resolution of the proteins.

The recorded diagrams are similar in their main features, but differ in details characteristically from species to species. There is an over-all similarity in that the number of the electrophoretic peaks varies in a very small range from 6 to 8 (as shown in the diagrams). The form of diagram of each species has been found to be constant enough to permit identification of the fish by means of the electrophoretic analysis at the muscle extract obtained under the same conditions.

Parallel analysis of the proteins present in pike muscle extract conducted in free solution and on filter paper revealed very similar electrophoretic properties. On filter paper, however, the resolution was better than in free electrophoresis. In contrast, the distribution and mobilities of components

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Richard McDonald

6. 71

Needed facilities and handling procedures are simple. For instance, it is recommended that pancreas and thyroid glands be placed into a stainless steel bucket resting in a larger bucket containing ice. At hourly intervals they should be transferred to a freezer held at 0° F. or lower. Higher temperatures allow reactions which rob the glands of their potency.

How frequently the packer should sell glands depends upon the rate of kill. An experienced laboratory states that glands can be accumulated for about four months as a maximum holding period.

It is emphasized that at no time must glands be allowed to rise above 0° F. as higher temperatures destroy the potency of the product. Careful workmanship is necessary to meet the exacting standards. To hold the interest of the workmen, a series of posters is available that portrays the role of glands in modern medicine.

The seriousness of the animal gland supply is exemplified by the offer of one of the biochemical laboratories to visit and set up a gland collection program at no cost or obligation to the packer. Qualified personnel train the packers' employees in the location, identification, removal, collection and packaging of the glands.

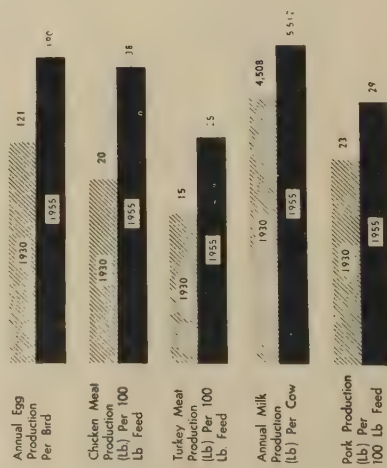
7. 522

can perhaps be more easily measured in the latter case.

The combination of ethanol fractionation at low temperatures with electrophoretic analysis proved to be a very suitable method for the study of proteins. Using this method, an extract of pike muscle was divided into six fractions which contained all the components found in electrophoresis before fractionation. By running each of the fractions separately in parallel on filter paper, it was possible to compare the electrophoretic properties of the components of different fractions. In some cases fractions homogeneous according to the electrophoretic analysis at one pH value proved to be heterogeneous at another pH. However, paper electrophoresis as at present conducted is probably not sensitive enough to reveal all the components which according to some enzymological investigations may be present in very low concentration in muscle extracts of low ionic strength.

6. 190

INCREASES IN EFFICIENCY IN POULTRY AND LIVESTOCK INDUSTRIES



6. 3

7. Provisions should be made to blow-back with humid, hot air to prevent any gel formation on the filter media.
 8. Spray washing of the cake is necessary to maximize extract recovery. Provision should also be made for spray washing the drum heads and shell upon shut down.
 9. All parts in contact with the slurry or filtrate should be of stainless steel to prevent corrosion or contamination.
 10. The filter cake can be reslurried and discharged from a single cake receiver through a liquid level control valve.
 11. Lead and trail pipes are required on each drum section because of the high viscosity of the liquid extract.
 12. The pressurized gas should be maintained at 200° -205° F. to prevent any cooling of the feed slurry, cake or filtrate. Upon cooling, a gel may be formed which might blind the filter media.
 13. Air can be used as the pressurized gas medium.
 14. High pressure air requirements can be minimized since a dry cake need not be discharged. The primary consideration is maximum recovery of clean extract. Thus, provision should be made for back-pressure during the dry phase of the cycle. This will minimize air requirements and still permit full pressure drop during the form phase of the cycle.
 15. Because of the value of the extract liquor, a moisture trap as well as a receiver should be used to prevent any entrainment losses.
- A flow sheet for a proposed filter which meets these requirements is presented and described. The primary advantages of the installation are (1) easy and completely automatic operation, (2) economy of filter and saving, (3) greater extract recovery, consistent quality, and (4) minimum labor requirements.

7. 51 PROPOSAL OF A NEW NITROGEN FACTOR FOR CALCULATING PROTEIN IN THE EDIBLE PORTION OF HERRING Dietrich, Rudolf Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter 9 (November 1953) In obtaining the nitrogen factor for herring, the Ritthausen copper hydroxide process, originally perfected for milk studies, was used to determine pure protein. About 3 g. of herring filets with skin on were blended in a Starmix and boiled in 50 ml. of water. Twenty-five ml. of copper sulfate solution were added, and 25 ml. of NaOH then stirred in. Liquid was carefully decanted from the settled precipitate, which was then washed repeatedly with water, filtered, and refiltered until the filtrate showed no more reaction with ferropotassium cyanide. Pure protein of the filtrate was calculated by multiplying the Kjeldahl nitrogen value with the factor N x 6.25, for 71 analyses. There was a mean difference of 1.83 percent between the analytically obtained values for pure and crude protein (6.25). Crude protein, fat, water, and total ash added up to 101.5 - 102 percent. Due to the good agreement between herring gelatin content (2.29 percent, according to Koenig and Splitgerber) and the difference between crude and pure protein, the nitrogen factor must be between the gelatin factor N x 5.55, and N x 6.25. As a further test, the theoretical protein value was calculated from 129 analyses thus: 100 - (fat, water and total ash). Analytical values for water and total ash were established and the appropriate fat value taken from the fat and water curve. The average deviation in these analyses from the analytically determined pure protein value was ± 0.47 percent. COMMERCIAL FISHERIES ABSTRACTS VOL. VIII, NO. 11, PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: C. N. Lee	7. 7 REPORT ON TOTAL SOLIDS AND ETHER EXTRACT IN FISH AND OTHER MARINE PRODUCTS Risley, H. M. (Food and Drug Administration, Seattle, Washington) Journal of the Association of Official Agricultural Chemists 39, No. 2, 197-200 (May 1955) Total solids.--A method for the determination of total solids in fish and other marine products (excluding raw oysters) was adopted as first action, <i>ibid.</i> 37, 70, 602, 1954. During 1954, the method was applied to canned lobster, crab, mussels, tuna, and to raw scallops and clams. A drying time of one and one-half and two hours in the forced-draft oven was compared with the one-hour drying time specified to learn if additional time was necessary. It was not found necessary to increase the drying time beyond one hour. The forced-draft oven method gave good results with these additional types of fish products (table 1, over). If available, the use of the forced-draft oven will save considerable time over the use of the air oven. A method for determining total solids in raw oysters in a forced-draft oven was adopted as first action. During 1954, the method was studied for use with other fish products. The findings of this study are reported in table 1. They did not agree with those of the general method, therefore, drying intervals of two and two and one-half hours were also tried. The method did not appear to be suitable for the determination of total solids in other fish products. Ether extract.--A rapid method for the determination of ether extract in canned salmon was described, <i>ibid.</i> 37, 70, 602 (1954). The method was tried as a means of determining the ether extract in raw halibut and salmon without success. Raw fish appeared to require acid hydrolysis to release the fat prior to extraction. Somewhat better results were obtained with raw clams probably because they could be finely ground in the Waring blender for more complete extraction by the ether. Otherwise, the method does not appear suitable for use in determining ether extract in raw fish. The results obtained with canned fish products were fairly consistent with those obtained with canned salmon, therefore this method gives considerable promise as a rapid sorting method. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VIII, NO. 11, PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerd
8. 8 VOLATILE BASES AND SENSORY QUALITY FACTORS IN ICED WHITE FISH Ehrenberg, A. S. C. and Shewan, J. M. (Torry Research Station, Aberdeen) Journal of the Science of Food and Agriculture 6, No. 4, 207-217 (April 1955) Subject.--The use of the total volatile-base and trimethylamine content of fish flesh as a chemical measure of spoilage. Exploratory experiments were carried out under controlled specific non-representative conditions. A single catch of fish was used for each experiment. Purpose.--To determine (1) the precision attainable under conditions believed to be optimum, and (2) the differences to be expected from different catches of fish. Experimental.--Three experiments were carried out with cod caught in February 1952 off Andenes (Lofoten Islands), Aberdeen (North Sea), and Cape Borthen (Spitzbergen). The cod were gutted, washed, and packed in boxes with ice on board ship. Twelve cod from each catch were selected at random and examined on arrival at Torry Research Station. The remainder were stored in ice and then sampled in lots of 12 at intervals of two to four days over a period of 20-23 days. Sensory evaluations were carried out on the whole cod, and both chemical and sensory evaluations on cod filets. Trimethylamine and total volatile bases were estimated as milligrams of nitrogen per 100 cubic centimeters of trichloroacetic acid muscle extract by Beatty and Gibbons (1936) modification of the Conway method. Sensory assessments were made with a trained panel of four to six members. Results.--The spoilage rates of the sensory variables (figure 5, over) and the logarithmic spoilage rates of the chemical variables (figure 3, over) are approximately linear. Certain relationships between the variables (figures 4, 6, and 7, over) are the same in the three experiments. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VIII, NO. 11, PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerd	8. 612 SOME UNUSUAL CAROTENOIDS FROM TWO NUDEBRANCH SLUGS AND A LAMPFRID FISH Goodwin, T. W. (University of Liverpool) and Fox, D. L. (University of California) Nature 175, No. 4468, 1086-1087 (June 18, 1955) Carotenoids from three conspicuously pigmented animals found in the waters off southern California were examined. Two whole specimens of (<i>Archidoris montereyensis</i>), the sea lemon, were finely disintegrated under acetone in a Waring blender. When the contents of the blender was allowed to settle and separate, a yellow pigment was found to have dissolved in the acetone layer. Light petroleum was added and the pigment was caused to transfer from the acetone into the light petroleum by dilution of the acetone with water. In a partition test with 90-percent methanol all of the pigment remained in the light petroleum. The absorption spectrum of this pigment was very similar to that of B-carotene. When this pigment was chromatographed on activated alumina about 5 percent of the total pigment, which was eluted with light petroleum containing five percent ether, appeared to be B-carotene, whereas the other 95 percent of the pigment migrated downward when more ether (10-20 percent) was added to the light petroleum. This other 95 percent of the pigment had an absorption spectrum maxima at 475 mμ, 450 mμ, and an inflection at 425 mμ (figure 1, over). Therefore the other 95 percent of the pigment differed slightly from B-carotene and could be separated from chromatographically authentic B-carotene. Two specimens of (<i>Flabellina</i> iodinea), the purple sea slug that was extracted in the same manner as was <i>Archidoris</i> yielded a hypophase carotenoid that had a single symmetrical absorption maximum at 470-475 mμ in petroleum ether (figure 1). This absorption maximum indicates that the pigment might be an oxygenated carotenoid possibly of ketonic nature. This pigment did not exhibit any acidogenic properties after treatment with ethanolic potassium, therefore it was not of the astaxanthin class. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VIII, NO. 11, PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerd

8. 612 (Cross Reference: 8. 59)

The change in the color of *Flabellina* from purple to red-orange upon treatment with alcohol suggests a carotenoid-protein complex.

Lampris regius, a large oceanic opah or moonfish, contains a bright red pigment in its skin, fins, lips, and tongue. This pigment, which can be recovered from any of these tissues, is similar to the pigment obtained from *Flabellina* in that it is non-acidogenic. Pigment from *Lampris regius* exhibits a symmetrical, single band absorption spectrum with its maximum at 475 mμ in petroleum ether and at 504 mμ in carbon disulphide (figure 1). *Lampris regius* does not store the crustacean carotenoid astaxanthin, however it may derive its own peculiar carotenoid ultimately from such a source through its heavy diet of argonauts.

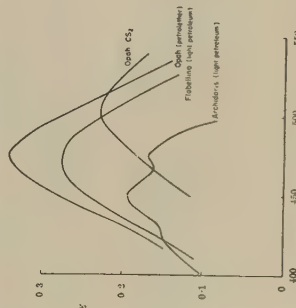


Fig. 1.—Absorption spectra of the carotenoid pigments obtained from *Lampris regius* (this opah), *Flabellina*, and *Argonauts*.

TABLE 1.—Per cent total solids in various fish products; comparison of methods

PRODUCT	METHOD FOR PURE PRODUCTS					METHOD FOR BULKY PRODUCTS				
	1 mm	1.5 mm	2 mm	5 mm	15 mm	1 mm	1.5 mm	2 mm	5 mm	15 mm
Frozen Japanese scallops	15.12	15.09	15.06	15.07	15.32	15.18	15.18	15.18	15.11	15.11
Same as above, re-frozen 2 weeks and thawed	15.28	15.23	15.20	15.03	15.40	15.32	15.32	15.32	15.26	15.26
Fresh Little Neck clams	20.24	20.21	20.14	20.12	20.13	20.14	20.14	20.14	20.07	20.07
Canned smoked Holland mussels in oil	51.31	51.11	51.13	50.90	50.58	51.79	51.79	51.79	53.02	53.02
Canned Canadian lobsters	17.12	17.06	17.05	17.05	17.05	17.05	17.05	17.05	19.25	19.25
Canned King crabmeat	23.71	23.70	23.70	23.72	23.86	23.84	23.84	23.84	23.79	23.79
Canned Dungeness crabmeat	24.28	24.25	24.21	24.21	24.56	24.45	24.45	24.45	24.43	24.43
Canned grated tuna in oil	48.86	48.83	48.84	48.87	48.87	48.87	48.87	48.87	50.58	50.58
Same after 2 days in refrigerator	48.60	48.57	48.57	48.57	48.57	48.57	48.57	48.57	49.61	49.61
Canned solid pack tuna in brine	26.57	26.49	26.49	26.49	26.49	26.49	26.49	26.49	28.92	28.92
Same after 2 days in refrigerator	26.36	26.35	26.35	26.35	26.35	26.35	26.35	26.35	27.82	27.82
Canned Maine sardines in soybean oil	38.53	38.52	38.52	38.52	38.52	38.52	38.52	38.52	39.09	39.09
	38.44	38.43	38.43	38.43	38.43	38.43	38.43	38.43	39.02	39.02

7. 7

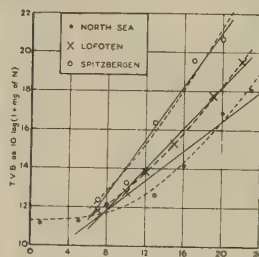


FIG. 3.—Total volatile-base content of the North Sea, Lofoten and Spitzbergen fish plotted as batch means against days in ice. Quantitative regression equations are indicated by broken lines.

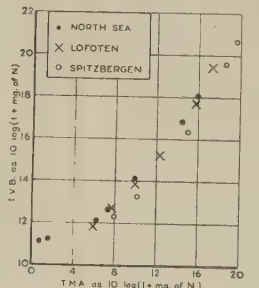


FIG. 4.—Total volatile-base content of the North Sea, Lofoten and Spitzbergen fish plotted as batch means against "trimming" batch means.

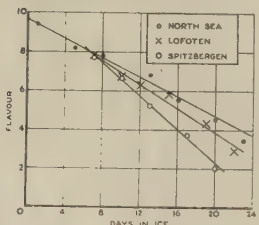


FIG. 5.—Flavour scores of the North Sea, Lofoten and Spitzbergen fish plotted as batch means against days in ice.

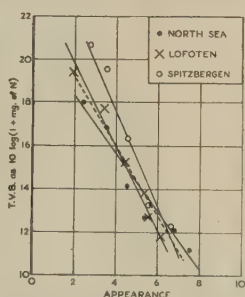


FIG. 6.—Total volatile-base content of the North Sea, Lofoten and Spitzbergen fish plotted as batch means against raw appearance batch means; an "average" line for the North Sea and Lofoten fish together is indicated by the broken line.

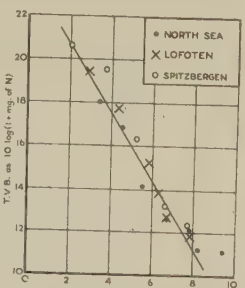


FIG. 7.—Total volatile-base content of the North Sea, Lofoten and Spitzbergen fish plotted as batch means against flavour batch means.

For calculating a new nitrogen factor from these figures it was assumed that the nitrogen factor was unknown. The analytical data necessary for Kjeldahl nitrogen determinations were used in setting up the following calculations:

$$\text{Crude protein (\%)} = \frac{\text{titration value} \times \text{dilution level} \times 0.0014 \times 6.25 \times 100}{\text{weight of sample}}$$

X was set up for the value 6.25 and obtained thus:

$$X = \frac{\text{theoretical protein content (\%)} \times \text{weight of sample (g)}}{100 \times \text{titration value} \times \text{dilution level} \times 0.0014}$$

$$(\text{ml. } 1/10 \text{ N H}_2\text{SO}_4)$$

The nitrogen factor N x 5.721 was found as the average value from 129 analyses, with an average error of ± 0.019 . From this factor the average nitrogen content of the edible portion of herring is calculated at 17.48%.

Kjeldahl nitrogen values multiplied with the new factor N x 5.721, differed by an average of 0.004% from analytically obtained pure protein values. Since the protein curve runs almost parallel to the water curve, the correlation between water and protein content was calculated from the Bravais formula, providing the basis for a correlation coefficient of 0.909, with a standard error of 0.0169. With the help of the regression coefficient, the protein was calculated in setting up the fat and water curve, with the water content selected as the base. Protein, and fat and water curves make it possible to account for the fat content with an accuracy of 0.7%, and the protein content with an accuracy of $\pm 0.45\%$ from a water determination, if the raw material contains no more than 0.4% salt.

7. 51

2. 118 BRINE COOLING AND FREEZING Anonymous Pan American Fisherman 10, No. 1, 20 (August 1955) Work has continued the past ten years on developing the best means of refrigerating tuna and sardines using refrigerated brines. Attempts at increasing the freshness of these fish were made by using indole, hydrogen sulfide, ammonia, trimethylamine and carbonyl compounds. Since none of these methods gave satisfactory correlation with organoleptic tests, another procedure, the volatile-reducing substance, was developed. Lowering the temperature of the brine, regardless of concentration, decreased the penetration of salt into the tuna and sardine samples studied. Denaturation of protein was measured by determining the nitrogen content of the press juice of fish. Soluble-nitrogen content was less for frozen fish stored at relatively high temperatures (for example 20° F.) than at lower temperatures (for example -5° F.). A brine cooling system for holding sardines or mackerel at 35° to 40° F. is described. The brine spreader inlet at the bottom of each brine tank is essential to the system's operation. Rapid circulation of the brine must be achieved so that fish in all parts of the tank will have a temperature of 40° F. within two or three hours. In general, a temperature of 40° F. will reduce bacterial spoilage to a sufficient degree to permit temporary storage of sardines. A temperature of 20° F. is required to stop bacterial action for longer storage periods as is required with tuna. Other changes that occur in tuna indicate that a still (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Lois Elgin	2. 118 FACTORY SHIP PUSCHKIN BUILT FOR RUSSIAN ACCOUNT Anonymous World Fishing 4, No. 7, 36 (July 1955) In 1954 the Sudolport, Moscow, placed an order for factory trawlers, the first of which has been completed. The vessels have a length of 234 feet b. p., and a moulded breadth of 41 feet. The tonnage is 2,555 G. R. T. They are driven by a 1900 b. h. p. diesel engine and have a speed of approximately 12 knots. A crew of about 100 men work on a two-shift system. The purpose of this type of ship is to process and freeze the catch on board. The factory plant takes over a great part of the main deck. To obtain a continuous flow when processing, a slipway up which the net is hauled was fitted so that fishing could be done over the stern. The fish are then conveyed via a chute to the factory deck underneath. There are several places along the chute where the fish can be killed, the offal going to the fish meal factory, and the liver to a sorting table and from there to the preserves or liver oil production. The killed fish pass a heading machine on the way to the filleting machine. The fillets are mechanically skinned and weighed in certain portions, then taken by collection trucks to the freezing tunnels where they are deep frozen. After freezing they are glazed and mechanically packed. The packages are carried by conveyor belts to refrigerated holds where they are stored. If it is desired the fish can be frozen and stored whole. On the trial trip of the Puschkin in the Barents Sea, the catching gear and factory plant proved satisfactory in practice. It appeared that fishing over the stern was better and easier than the method used on a normal trawler. No damage to the fish or to the nets was encountered by hauling up on the slipway. COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Mabel Edwards
7. 53 RAPID DETERMINATION OF FAT IN MEAT PRODUCTS Salwin, Harold; Block, I. K.; and Mitchell, J. H. (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois) Journal of Agricultural and Food Chemistry 3, No. 7, 588-593 (July 1955) A modified Babcock procedure for the determination of fat in meat products is proposed. The method involves the use of a digestion mixture of equal volumes of glacial acetic acid and of 60 percent perchloric acid and the determination is carried out in a Paley-type Babcock cream bottle. It is stated that under the conditions used there is no hazard in connection with the use of the perchloric acid if the reagent is handled in storage by methods recommended for handling perchloric acid. Results of the method, which requires 30 minutes to carry out, have been compared with results obtained by the longer A. O. A. C. method (involving solvent extraction of dried samples). Results for analysis of ground beef, pork, veal, canned beef with gravy, and other meat products show good agreement between the two methods. A brief description of the method follows: Use either meat ground in a food chopper or homogenized in a food blender. Weigh 9.00 grams into a tared Paley-type Babcock bottle of 20 percent size if the fat content is under 15 percent or of 50 percent size if the fat content exceeds this amount. Add 30 ml of 1:1 (by volume) glacial acetic acid -- 60 percent perchloric acid. Stopper the bottle and swirl to mix. Immerse in a boiling water bath and agitate occasionally during the 12-minute heating. Remove the bottle from the water bath and add more acid digestion reagent until the fat column rises into the calibrated neck. Centrifuge for two minutes (at 875 r. p. m. for a 15-inch diameter centrifuge). If necessary, add more reagent to bring fat column into the calibrated neck. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. E. Stansby	3. 19 NUTRITIVE EFFECTS ON FOODS STERILIZED BY IONIZING RADIATIONS Kraybill, Herman F. (Medical Nutrition Laboratory, Denver, Colorado) Nutrition Reviews 13, No. 7, 193-195 (July 1955) One of the many problems in radiation sterilization of foods is a selection of the type of radiation for processing. Both beta (fast electrons) from a resonant transformer or Van de Graaff generator, and gamma radiation with radioisotopes such as cobalt and mixed fission products have been used. X-rays have also been used as a gamma ray source, but less efficiently, since a large amount of energy is dissipated in the form of heat. Beta rays having an energy of 5 million volts are capable of penetrating the product one inch. Gamma rays of variant intensity penetrate much farther into the product. For the destruction of spoilage microorganisms a range varying from 1,500,000 to 4,000,000 roentgen equivalents physical (rep) are commonly used. The shelf life of prepackaged meats may be extended five-fold by 50,000 rep. Some of the many problems involved in the radiation sterilization of foods are (1) the objectionable off-flavors, odors, colors and undesirable textures produced by definite chemical alterations in foods as the result of ionizing radiations; (2) the costs of shielding and the potential hazards from the radiation process; and (3) the effect of radiation on nutritive value of the processed food. A radiation dosage exceeding 5 million rep must be utilized for enzyme inactivation in radiation sterilization of foods. Failure to inactivate the enzymes may permit a breakdown in fats, proteins and other constituents in the food during storage. Kung, Gaden, and King (1953) in working with milk and milk products demonstrated that vitamin A, tocopherols, and ascorbic acid were highly sensitive to gamma radiation at the sterilization dose level. At the same radiation level, the carotenoids and riboflavin were moderately sensitive; whereas the enzyme phosphatase, which is sensitive to heat treatment, was only slightly changed. In pure solution, ascorbic acid is more radiosensitive than niacin and (over) COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO 11 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerd

7. 53 Read fat column with aid of a pair of dividers. If the reading is greater than 11.0 for the 20 percent bottle add drops of glymol before making the final reading. Always add three drops of glymol before making the final reading when using the 50 percent bottle. With glymol present, measure the column from the lowest point to the level interface between the fat and colored glymol. Without glymol, measure the fat column from the lowest to the highest point (including the meniscus). The final reading represents the percent fat in the sample.	3. 19 riboflavin; whereas riboflavin is the least radiosensitive of the three. Vitamin B₁₂ in pure solution has been shown to be even more radiosensitive than ascorbic acid. The changes described above occurred in pure solutions, however the decomposition of labile vitamins in a complex system such as a food may not be comparable. Sulfhydryl compounds are extremely sensitive to ionizing radiation; hence cysteine, like ascorbic acid which is radiosensitive, can be used as a free radical acceptor in accomplishing the elimination of off-flavors in foods. In like manner, methionine has a protective effect on niacin in aqueous solution when treated with cathode rays. High concentrations of essential unsaturated fatty acids have an accelerative effect on the autooxidation of essential metabolites. During irradiation some degradative changes occur in the fats. Fats, which are susceptible to oxidation, may yield peroxides. Proteins with sulfur-containing dipeptides may rupture and yield hydrogen sulfide and mercaptans. These compounds have been produced in meat by irradiation. Pigmental changes which give rise to discoloration and off-flavors and odors have also resulted. Studies made by feeding a ration that had been treated in a capactron to rats showed that there was an impairment in the fertility of the male and increased mortality in litters which probably was due to the destruction of vitamin E.
2. 118 lower temperature is desirable. Recommended practices for refrigeration of tuna aboard the vessel include: 1. Chill tuna in precooled sea water at 29° to 30° F., adding tuna to the brine until the well is full. 2. Remove brine completely from stage 1. Add a 20-30 percent brine precooled at 0° to -4° F. Circulate this brine at a rate of 10 gallons per minute per ton of fish until the fish are frozen and reach a temperature of 0° to 10° F. 3. Hold fish in strong brine for at least 48 hours at a temperature of 10° F. or lower. Remove brine and store the fish in dry wells at a controlled coil temperature of no higher than 10° F., preferably lower." Higher temperatures than those recommended for freezing tuna will result in the dissolving of considerable protein in the brine which represents economic loss.	2. 118

0. 35 BIOCHEMISTRY OF FISH PROTEINS Geiger, E. Fortschr. Chem. org. Naturstoffe 5, 287-289 (1948) Chemical Abstracts 44, No. 12, 5413 (1950)	3. 238 PROTECTIVE PACKAGING WITH MOLTEN THERMOPLASTICS Rabak, William Canner 110, No. 19, 11-12 (1950) Chemical Abstracts 44, No. 21, 10189 (1950)
0. 35 SOME BIOCHEMICAL ASPECTS OF MARINE CAROTENOIDS Fox, D. L. Fortschr. Chem. org. Naturstoffe 5, 20-39 (1948) Chemical Abstracts 44, No. 12, 5413 (1950)	3. 238 A STUDY OF OXYGEN DIFFUSION THROUGH FROZEN-FOOD PACKAGING MATERIALS Fillinger, G. A. and Beale, W. L. Proc. Amer. Soc. hort. Sci. 60, 272-278 (1952) Food Science Abstracts 26, No. 6, 711 (November 1954) A modified form of the apparatus of Smith and Kiebler was used to determine the diffusion of carbon dioxide through polythene, 300 MSAT cellophane, and kraft bags, waxed and laminated cartons, and an ice-cream carton; a glass beaker was used as control. The polythene and cellophane bags were the most efficient oxygen barriers, followed by the waxed carton and then the laminated carton. The ice-cream carton and the kraft bag were not efficient oxygen barriers. The polythene and the cellophane bags were efficiently sealed by a hot iron, but the waxed and the laminated cartons allowed penetration of oxygen at the junction of container and lid.
0. 35 EFFECT OF pH AND SALINITY UPON THE ADHESIVE LAYER OF FLOUNDER EGGS, WITH SPECIAL REFERENCE TO ITS SWELLING RATE Shirase, Shiro Zool. Mag. Tokyo 63, 271-273 (1954) Chemical Abstracts 49, No. 11, 7759 (1955)	5. 41 PURIFICATION OF VITAMIN B₁₂ CONCENTRATES Fricke, Howard H. U. S. Patent 2,582,589 (January 15, 1952) Chemical Abstracts 46, No. 8, 3714 (April 25, 1952)
3. 230 TECHNIQUES OF FREEZING AND STORING FISH AND SEAFOOD. PART II Butler, Charles Frosted Food Field 20, No. 4, 20-22 (April 1955) (Abstract of this article appears under 2. 15 page 7 - September 1955 issue)	5. 41 RELATION BETWEEN VITAMIN D AND B₁₂ Frolich, Allan Nature 174, No. 4427, 462-463 (September 4, 1954) Abstract of this article appears under 0. 7 page 9 - December 1954)
3. 230 FROZEN FISH STAY ALIVE IN LARGE BLOCKS OF ICE Anonymous N. F. I. Flashes, No. 425 (January 21, 1955) A new method of preserving fish, by which they stay alive in large blocks of ice, has been perfected at Denmark's Fishery Biological Institute. The fish are first put to sleep with an injection of uretan and then shock-frozen at 40° below zero F. and placed in water that is then frozen to 10° below zero. A month later the block of ice containing the fish is thawed out and six out of every seven fish "Swim happily again."	5. 41 THE CHEMISTRY AND PHARMACY OF VITAMIN B₁₂ A LITERATURE SURVEY Reimers, F. Arch. Pharm. Chemi 58, 659-676 (1951) 43 references Chemical Abstracts 46, No. 6, 2757 (March 25, 1952)

6. 132 TWO-STAGE DRYING IN ONE DRYER Anonymous Meldinger fra SSF, No. 6, 128 (December 1954) Norwegian patent no. 83553 comprises the arrangement of adjustable openings in ordinary rotary dryers and a transport system for returning partly dried material to the inlet of the dryer to permit two-stage drying in one dryer.	6. 109 TRIMETHYLAMINE IN FISH PRODUCTS FOR ANIMAL FEEDING. AN EXPERIMENT ON THE INFLUENCE OF TRIMETHYLAMINE ON THE FISHY TASTE AND FISHY SMELL OF BACON van Koetsveld, E. E. Conserva 2, 44-49 (1953) Food Science Abstracts 27, No. 2, 139 (March 1955) The trimethylamine contents of different herring meals and L. K. C. fodder (A Danish fish silage) were determined. To investigate the effect of trimethylamine on pig flesh, during the 42 days before slaughter pigs were given 2 g. of trimethylamine hydrochloride per head per day (i. e. twice as much trimethylamine as would be present in ordinary rations containing 10 percent of herring meal). Trimethylamine could not be detected organoleptically or chemically in the bacon and pork from these pigs.
6. 132 THE INDUSTRIAL HYDROLYSIS OF WHALE MEAL Kitayama, Osamu J. Agr. Chem. Soc. Japan 18, 843-851 (1942) Bull. Agr. Chem. Soc. Japan 18, 70 (1942) (in English) Chemical Abstracts 45, No. 5, 3529 (April 25, 1951)	6. 109 TRIMETHYLAMINE IN FODDERS CONTAINING FISH MEAL van Koetsveld, E. E. Conserva (The Hague) 2, 44-49 (1953) Chemical Abstracts 49, No. 3, 1602 (1954) The amount of trimethylamine (I) in different herring meals and a Danish fish silage (LKC) was determined. For herring meals the numbers vary from 1.6 to 50 mg. N from 1 per 100 g.; in LKC from 51 to 118 mg. Three pigs were fed on a diet with LKC, and an extra amount of I was given. The meat and lard of these animals were completely free from I and no fishy odor or smell could be found.
6. 135 CAN THE SMELL FROM HERRING MEAL PLANTS BE AVOIDED? Gloppstad, E. Sand, G.; and Arnesen, E. Meld. SSF, No. 4, 78-84 (1953) Food Science Abstracts 27, No. 2, 140 (March 1955) There are three ways of reducing the smell, namely, less severe drying, condensation of the gases coming from the dryer, and chlorination after condensation. Drying at a maximum initial temperature of 400° to 500° C. greatly reduces the smell from the stack and makes the subsequent condensation treatment more effective.	6. 82 THE PROTEINIC NETWORK OF NACRE AND PEARL Gregorie, Ch.; Duchateau, Ch.; and Florin, M. Ann. Inst. oceanog. (Paris) 31, No. 1 (1955) Chemical Abstracts 49, No. 11, 7760 (1955) Decalcification of shells of cephalopods, gastropods, and pelecypods left a perforated network of organic matter. The Na borate extn. did not destroy the structure, however, a carbonate extn. formed a polypeptide residue which was rich in amino acids. Alanine and glycine were dominant.
6. 135 DEODORIZATION OF FISH OIL Sasaki, Rinjiro Japan 176, 743, (September 30, 1948) Chemical Abstracts 45, No. 10, 4470 (May 25, 1951)	6. 82 THE UTILIZATION OF CHITIN. II. PREPARATION OF TARTARIC ACID FROM GLUCOSAMINE. 2. Sumiki, Yusuke; Yatta, Motoo; and Matsushima, Satoshi J. Agr. Chem. Soc. Japan 23, 6-7 (1949) Chemical Abstracts 44, No. 17, 7773 (1950)

7. 595 INVESTIGATION AND DETERMINATION OF PROPYL GALLATE (PROGALLINE P) IN EDIBLE FATS Terrier, J. and Deshusses, J. Mitt. Lebensm. Hyg. 40, 221-226 (1949) Chemical Abstracts 44, No. 2, 769 (1950)	7. 8 ANALYTICAL CONTROL OF THE ALTERATION OF FISH Montequi, R. Inform. quim. anal. (Madrid), 1, No. 7, 156-161 (1947) Chemical Abstracts 43, No. 2, 782 (1949) Chem. analysis of volatile basic N, trimethylamine, actual acidity, or buffer capacity as well as the alteration of the fat and the fluorescence does not give concordant results; the results have only a limited and relative value.
7. 595 THE DETERMINATION OF TOTAL TOCOPHEROL Edisbury, J. F.; Gillo, Jean; and Taylor, R. J. Analyst 79, No. 943, 617 (October 1954) 7. 595 DETECTION AND DETERMINATION OF 5-NITROFURFURAL SEMI-CARBAZONE (NITROFURAZONE) IN FISH MEAT PASTE Kawashiro, Iwao and Fukuzawa, Fumi Bull. Natl. Hyg. Lab. (Tokyo), No. 71, 27-34 (1953) Chemical Abstracts 49, No. 8, 6487 (1955)	7. 8 SENSORY TEST METHODS. II. EFFECT OF PREVIOUS TESTS ON CONSUMER RESPONSE TO FOODS Hanson, H. L.; Davis, J. G.; Campbell, A. A.; Anderson, J. H.; and Lineweaver, Hans Food Technology 9, No. 2, 56 (February 1955) The ratings given foods in consumer-type tests are shown to be influenced by the quality of previously tested samples, even though samples are presented singly with a two-day interval between tests. There is a greater tendency for consumers to rate succeeding samples lower rather than higher than the first sample.
7. 65 HISTOCHEMISTRY. XXVII. THE DETERMINATION OF L-ASCORBIC ACID, AND DEHYDRO-L-ASCORBIC ACID PLUS DIKETO-L-GULONIC ACID IN MICROGRAM QUANTITIES OF TISSUE Glick, David; Alpert, Morton; and Stecklein, Helen R. J. Histochem. Cytochem. 1, 326-335 (1953) Chemical Abstracts 48, No. 15, 6852 (August 10, 1954) Spectrophotometric 2, 6-dichloroindophenol and 2, 4-dinitrophenylhydrazine techniques for the microchem. detn. of L-ascorbic, dehydro-L-ascorbic, and kikeito-L-gulonic acids are present.	7. 85 ON SIMPLE HYGIENIC EXAMINATION METHOD OF BACTERIA FOR FISH Sekine, Y. and Nakakubo, T. J. Tokyo Univ. Fish. 29, 193-197 (1953) Food Science Abstracts 26, No. 6, 623 (November 1954) In the authors' new method of counting bacteria on the surface of fish, a square of sterilized paper is pasted on the fish, and then applied to a plate of suitable agar medium. A comparison with the "scratch" method showed the two to be about equally efficient; as the paper-pasting method is simpler, and gives quicker results, it is to be preferred.
7. 65 THE DETERMINATION OF VITAMIN C IN THE PRESENCE OF INTERFERING MATERIALS. (SELECTIVE OXIDATION-REDUCTION METHOD) Spruyt, J. R.; Schuhmacher, J. P.; and Massen, B. (University of Amsterdam) Chem. Weekblad 46, 715-717 (1950) Chemical Abstracts 45, No. 10, 4295 (May 25, 1951)	7. 85 ON SIMPLE HYGIENIC EXAMINATION METHOD OF BACTERIA FOR FISH Nakakubo, Toshio and Sekine, Yutaka Bulletin of the Japanese Society of Scientific Fisheries 19, No. 4, 561-564 (August 25, 1953) (Es & Ts) Pieces of paper should be pasted on each side of the fish, and transplanted on Endo or E. M. B. agar plate.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst	Frosted Food Field
Analytical Chemistry	Industrial and Engineering Chemistry
Archives of Biochemistry and Biophysics	Industrial Refrigeration
Biochemical Journal	Journal of Agricultural and Food Chemistry
Bulletin of the Faculty of Fisheries, Hokkaido University	Journal of Applied Chemistry
Bulletin of the Japanese Society of Scientific Fisheries	Journal of Biological Chemistry
California Fish and Game	Journal of Home Economics
Canadian Fisherman	Journal of Nutrition
Canadian Journal of Chemistry	Journal of the American Chemical Society
Canadian Journal of Technology	Journal of the American Dietetic Association
Canner	Journal of the American Oil Chemists' Society
Chemical Abstracts	Journal of the Association of Official Agricultural Chemists
Chemical and Engineering News	Journal of the Fisheries Research Board of Canada
Chemical Engineering	Journal of the Science of Food and Agriculture
Chemistry and Industry	Maine Coast Fisherman
Commercial Fisheries Review	Meldinger Fra SSF (Herring Industry, Norway)
Drug and Cosmetic Industry	Modern Packaging
FAO Fisheries Bulletin	Modern Refrigeration
Federation Proceedings	National Fisherman
Feedstuffs	National Provisioner
Fisheries Newsletter (Australia)	Nature
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.	Nutrition Reviews
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.	Pacific Fisherman
Fisherman	Pan American Fisherman
Fishing Gazette	Poultry Science
Flour and Feed	Practical Home Economics
Food Engineering	Progressive Fish-Culturist
Food Manufacture	Quick Frozen Foods
Food Packer	Refrigerating Engineering
Food Preservation Quarterly	Report of the Food Investigation Board (Great Britain)
Food Processing	Science
Food Research	Southern Fisherman
Food Science Abstracts	Trade News (Fisheries Department, Canada)
Food Technology	Western Fisheries
	World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

7. 879	STANDARDIZATION OF VEGETABLE LECITHINS FOR USE IN THE MARGARINE INDUSTRY Desmuelle, P. Bull. mens. ITERG, No. 10, 29-32 (1948) Chemical Abstracts 43, No. 7, 2791 (1949)	8. 51	COAGULATION OF THE BLOOD OF ARTHROPODS. IV. FIBRINOGEN AND MUSCLE COAGULIN OF THE LOBSTER Duchateau, Ghislaine and Florquin, Marcel Bull. soc. chim. biol. 36, 295-305 (1954) Chemical Abstracts 49, No. 20, 12325 (1954) A method is described for the sepn. of fibrinogen from lobster plasma. The prepn. is electrophoretically homogeneous but not homogeneous when tested in the ultracentrifuge. It is much more sol. than bovine fibrinogen and appears to have a relatively low mol. wt. It is not acted on by bovine thrombin in the presence or absence of Ca. It is coagulated by a "coagulin" exid. from lobster muscle if Ca is present.
7. 879	A CHEMICAL TEST FOR ESTIMATING OILY AND FISHY OFF-FLAVOR IN BACON Askoe, E. and Madsen, J. Acta agric. scand., 4, 266-271 (1954) Food Science Abstracts 26, No. 6, 617 (November 1954) When samples of fat are boiled with sodium thiohebuturate solution, a red colour develops, proportional in intensity to the degree of oxidation of the unsaturated fatty acids. This reaction can be used to detect oily and fishy off-flavors in bacon, and is shown to give results in good agreement with tasting tests. Results obtained with bacon from pigs fed on fish sludge, and with 3,803 samples of bacon from different factories are also given.	8. 51	AMINO ACIDS IN PRAWN FROM BOMBAY Airan, J. W. and Thomas, Abraham J. Univ. Bombay 22, Pt. 5, Sci. No., Sect. B, No. 35, 48-49 (1954) Chemical Abstracts 49, No. 3, 1986 (1955) A comparative study of the amino-acid contents of chitin and muscle of Palaemon malcolmsonii was made by using circular paper chromatography. From hydrolyzates contg. an equiv. of 15% of N, the following amts. of amino acid were obtained (γ in muscle, chitin): leucines (7.7, 5.8), phenylalanine (5.3, 4.8), tyrosine (3.4, 4.0) alanine (5.4, 6.9), arginine (8.2, -), histidine (3.5, 6.2), lysine (6.2, 6.5), cystine (2.5, trace).
7. 89	THE QUANTITATIVE DETERMINATION OF HISTAMINE WITH COTTON ACID SUCCINATE Kadota, Hajime and Inoue, Juntaro Bulletin of the Japanese Society of Scientific Fisheries 19, No. 8, 916 (1953) (ES & TS) A decomposed meat extract of fish which contains histamine is extracted with n-butanol. The histamine is recovered from the butanol by means of a new cation exchange medium, cotton acid succinate.	8. 51	STUDIES ON THE PROTEINS OF FISH SKELETAL MUSCLE. 3. COD MYOSIN AND COD ACTIN Connell, J. J. (Torry Research Station, Scotland) The Biochemical Journal, 58, No. 3, 360-367, (November 1954) Proteins resembling rabbit myosin and rabbit actin have been prepared from cod muscle. Although most of the properties of cod and rabbit myosin are the same there is considerable apparent disparity between their ultracentrifugal properties. It is more difficult to prevent the concurrent extraction of actin when preparing fish myosin than with rabbit. In 0.6M potassium iodide solution, cod G-actin appears to exist as the dimer, though its exact molecular dimensions are uncertain.
7. 89	THE FRESHNESS OF FISH AND THE AMOUNT OF HISTAMINE IN THE FLESH. I. THE PRODUCTION OF HISTAMINE DURING AUTOLYSIS IN FISH FLESH I. Masao, Kimata and Akira, Kawai (Kyoto University) Bull. Research Inst. Food Sci., Kyoto University No. 5, 21-28 (1951) II. The production of histamine during autolysis 2: Ibid. No. 6, 23-28 (1951) Chemical Abstracts 46, No. 10, 4695 (May 25, 1952)	8. 51	AMINO ACID ANALYSIS OF CLUPEINE AND SALMINE Waldschmidt-Leitz, Ernst and Günther, Elfriede Makromol. Chem. 2, 120-126 (1948) Chemical Abstracts 45, No. 11, 4749 (June 10, 1951)

INDEX

Subject	Page No.	Card No.	Subject	Page No.	Card No.
Analysis, organic			Fishing methods		
Fatty acid chromatography	11	4. 11	Electrical fishing guide	5	2. 14
Paper-electrophoresis of protein	15	7. 522	Electrical fishing	5	2. 14
Determination of protein	17	7. 51	Freshness of fish		
Rapid fat determination	19	7. 53	Iced fish quality control	17	8. 8
Determination of nitrofurazone	25	7. 595	Analytical tests for freshness	25	7. 8
Determination of total tocopherol	25	7. 595	Surface-bacteria count method	25	7. 85
Determination of histamine	27	7. 89	Consumer response to foods	25	7. 8
			Histamine vs. fish freshness	27	7. 89
Analysis, vitamins, miscellaneous			Frozen fish, general		
Histochemical determination of vitamin C	25	7. 65	Frozen fish stay alive in ice	21	3. 230
Determination of vitamin C	25	7. 65	Frozen fish, packaging		
Analysis and composition, specifications and oil constants			Oxygen permeability of packages	21	3. 238
Solids and ether extract in fish	17	7. 7	Molten thermoplastic packaging	21	3. 238
Lecithins in margarine	27	7. 879	Frozen fish, processing		
Antioxidants			Fats for frying fish sticks	7	3. 237
Antioxidants for edible fats	11	4. 6	Processing fish sticks	7	3. 237
Determination of propyl gallate	25	7. 595	Gear, fishing		
Byproducts, miscellaneous			New shrimp trawl	3	2. 1121
Value of saving glands	15	6. 71	Oxygen requirements of bait fish	3	2. 1127
Protein of naacre and pearl	23	6. 82	Marine plant products		
Utilization of chitin	23	6. 82	Extraction of Irish moss	15	6. 3
Canned fish, processing			Marketing		
Fish canning in Yugoslavia	9	3. 33	Roll of home economist	5	2. 6
Chemistry and biochemistry, miscellaneous			North America, Alaskan fisheries and U. S. Territories		
Biochemistry of fish	21	0. 35	Tuna exploration	1	1. 0112
Effect of pH on flounder eggs	21	0. 35	Oils, chemical and physical properties		
Biochemistry of fish	21	0. 35	Fatty acid solubility	11	4. 23
Composition, organic			Oysters		
Carotenoids from aquatic animals	17	8. 612	Oyster processing research	1	1. 81
Amino acids of clupeine and salmine	27	8. 51	Preserved fish, miscellaneous		
Amino acids in Bombay prawns	27	8. 51	Ultrasonics and food technology	7	3. 19
Fibrinogen from lobster plasma	27	8. 51	Bacterial studies of herring	9	3. 8
Proteins of fish muscle	27	8. 51	Radiation and Nutrition	19	3. 19
Hydrocarbon content of liver oil	29	8. 53	Preservatives and sanitation		
Fatty acid content of foods	29	8. 53	Plant sanitation	7	3. 18
Composition, vitamins			Rancidity		
B-vitamins in organs of herring	29	8. 64	Test for fat oxidation	27	7. 879
Vitamin B ₁₂ in Vietnamese fish sauce	29	8. 64	Salt fish		
Vitamins of fish livers	29	8. 64	Browning of salt cured fish	9	3. 5
Exploratory fishing			Smoked fish		
Underwater television	3	2. 12	Electro-smoke solution	9	3. 4
Alaska fishery exploration	5	2. 12	Spoilage		
Factoryships			Bacterial flora of fish	3	2. 01
Shipboard freezing of tuna	19	2. 118	Determination of bacteria in fish	25	7. 85
Factory ship Puschkin	19	2. 118	Tuna		
Fish meal, nutritive value			Study of tuna reactions	1	1. 10
Nutritive value of fish meal	13	6. 190	Vitamins, vitamin A, chemistry		
Nutritive value of meal and solubles	15	6. 190	Vitamin A stability in mixed feeds	11	5. 112
Effect of trimethylamine on pig flesh	23	6. 199	Vitamin A in feeds	13	5. 112
Trimethylamine in fish meal	23	6. 199	Vitamins, vitamin B ₁₂ and protein utilization factor		
Fish meal and oil, manufacture			Vitamin B ₁₂ in nature	13	5. 41
Odor control in meal plants	23	6. 135	Purifying vitamin B ₁₂ concentrates	21	5. 41
Deodorization of fish oil	23	6. 135	Chemistry of vitamin B ₁₂	21	5. 41
Hydrolysis of whale meal	23	6. 132	Vitamins, miscellaneous		
Two-stage drying in one dryer	23	6. 132	Vitamin E in chick diet	13	5. 7
Fishery biology and fish culture			World fisheries and miscellaneous oceanic fisheries		
Guanine deamination by clams	29	9. 13	Philippine tuna fisheries	1	1. 019
Oyster metabolism	29	9. 13			

8. 53 STUDIES ON UTILIZATION OF THE LIVER OIL OF DEEP SEA SHARKS VII. HYDROCARBON CONTENT IN THE LIVER OIL OF THE ORDER OF "YOROZAME", DALATIIDAE Higashi, Hideo; Kaneko, Tokugoro; and Sugii, Kisaburo Bulletin of the Japanese Society of Scientific Fisheries 20, No. 4, 232 (1954) (ES, F & TS) The present paper deals with the physical constants of the liver oil of sharks belonging to Dalatiidae, which are "yorozame", Dalatias licha, "ondenzame", Somniosus pacificus and "kaeruzame", Heteroscymnus longus. 8. 53 SURVEY OF LITERATURE ON THE FATTY ACID CONTENT OF FOODS AND RELATED MATERIALS Privett, O. S. Annual Report of the Hormel Institute, University of Minnesota, 14-15 (1953-54) A literature survey consisting of an annotated bibliography and composition tables was made of the fatty acid composition of foods and related materials, covering all analyses reported from 1920 to 1950.	8. 64 THE VITAMINS OF FISH LIVERS Higashi, Hideo; Heral, Masao; Izeki, Shigeo; and Narita, Eizo J. Agr. Chem. Soc. Japan 20, 15-22, 103-110 (1944); 21, 25 (1946); 22, 14-16, 42-45 (1948) Chemical Abstracts 46, No. 17, 8812 (1952) V. Colorimetry of nicotinic acid by the cyanogen bromide method. Ibid. 20, 15-22 (1944) VI. Ibid. 20, 103-110 (1944) VII. Nicotinic acid content of fish livers. Ibid. 21, 25 (1946) VIII. Vitamin B₁ and C contents of fish livers. Ibid. 22, 14 (1948) IX. Riboflavin content of fish livers. Ibid. 22, 14-15 (1948) X. Vitamin D content of fish livers. Ibid. 22, 15-16 (1948) XI. Vitamin contents in relation to the appearance, specific gravity, and size of fish livers. Ibid. 22, 42-43 (1948) XII. Some experiments on the utilization of fish livers. Ibid. 22, 43-44 (1948) XIII. Summary. Ibid. 22, 44-45 (1948)
8. 64 B VITAMINS IN ORGANS OF HERRING Klungsoyr, M. and Bøge, G. Meld. SSF, No. 1 10-13 (1953) Riboflavin, niacin, and vitamin B₁₂ were found to be concentrated in the liver and heart. Intestines also showed high vitamin contents; microbial synthesis of B vitamins may occur in the digestive tract. The milt contained very little riboflavin or niacin; the niacin content may increase after spawning, since the milt accounted for about 18 percent of the total weight of the fish but contained only about 9 percent of the total niacin. 8. 64 THE VITAMIN B₁₂ ACTIVITY OF A VIETNAMESE FISH SAUCE "NUOCMAM" Villard-Goudou, Andre; Lambin, Suzanne; German, Albert; and Brigeau, Jeanne Compt. rend 238, 2193-5 (1954) Chemical Abstracts 49, No. 3, 1986 (1955) The vitamin B₁₂ activity of 12 samples of a Vietnamese condiment derived from various fish called "Nuoc-mam" (1) is reported to be equiv. to 25 to 200γ of vitamin B₁₂ liter.	9. 13 METABOLIC PATTERNS IN BIVALVES. I. DISTRIBUTION OF THE ACTIVITY TO DEAMINATE GUANINE IN THE SOFT PARTS OF THE CLAM, MERETRIX MERETRIX LUSORIA Ishida, Shuzo Science Repts. Tohoku Univ., 20, 4th Ser. 249-55 (1954) Chemical Abstracts 49, No. 5, 3423 (1955) 9. 13 SEASONAL VARIATIONS OF THE CILIARY ACTIVITY OF THE GILLS AND SOME CHEMICAL COMPONENTS IN OYSTER, OSTREA GIGAS Usuki, Itaru and Koizumi, Sadaaki Science Repts. Tohoku Univ. 20, 4th Ser. 309-17 (1954) Chemical Abstracts 49, No. 5, 3423 (1955) The ciliary activity, the gonadal condition, and the H₂O, blood sugar, and glycogen contents in the oyster, Ostrea gigas, were detd. monthly for 2 yrs. The ciliary activity and the H₂O content were min. in summer and max. in winter. The glycogen content was min. in summer and max. in May. These variations were closely correlated with the maturation of the gonads. The blood sugar ranged from 0.03 to 0.06 mg./dl. and did not show seasonal variations.

